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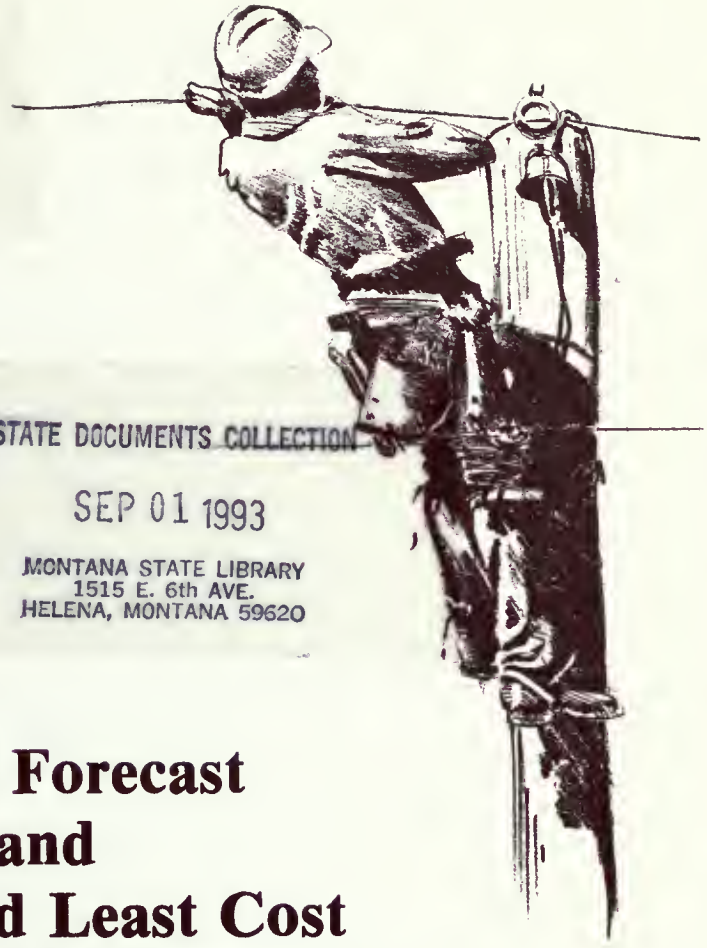

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Technical Appendix

The Montana Power Company

March 1993

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1.0 LOAD FORECAST

Every year, The Montana Power Company (MPC) develops a load forecast to provide a quantitative estimate of future electricity sales and loads. The forecast, which typically spans a horizon of 25 years, is used by numerous areas within MPC, including integrated least cost resource planning; short-run business and financial planning; power operations; and rate and regulatory affairs.

The information that MPC uses to develop its load forecast comes from a variety of sources. The sources include academic and business leaders, government agencies, other industries, and MPC management. Internal sources include transmission and distribution planners as well as division personnel, who are familiar with the local economies. This expertise is used in addition to and as a check of the analysis and research performed by the Market Research Department.

1.1 Process Overview

MPC's load forecast is developed through a multi-step process. First, historical annual sales data by customer class are collected and updated. The data are taken from accounting records, checked for accuracy, and reclassified if needed. Sales are collected for five major classes of customer, which include: Residential, (General Service) Commercial, (General Service) Industrial, Contract Industrial, and Other.

Exogenous (explanatory) variables that influence electricity consumption in the Residential, Commercial, and Industrial sectors are collected and updated as well. These variables include service territory population, nonfarm disposable income, electricity prices, percent of customers that heat electrically, number of customers, national production indices, weather, inflation, and fuel prices. Electricity prices are initially gathered from the Integrated Least Cost Planning Process.

The Residential, Commercial, and Industrial sales are forecast through econometric and regression analysis. The annual Contract Industrial sales are forecast through consultations with each customer. The annual Other sales, which include interdepartmental; government and municipal street lights; government and municipal special contracts (Yellowstone National Park and military); irrigation; and wholesale customer sales, are forecast through regression analysis, trend, and professional judgement.

The annual sales forecasts are then aggregated to total annual sales by summing the results of each of the five sectors' forecasts. The historical relationship between total annual sales (at the customers' meters) and energy load (at the generator) is estimated mathematically through regression analysis; the results are used to forecast annual energy load from the aggregated annual sales. System

energy loss is defined as the difference between annual sales and annual energy load derived from the regression analysis.

Monthly energy requirement estimates are derived from a series of models that shape annual energy to monthly energy based on historical monthly usage patterns. January's and July's monthly energy are forecast through econometric modeling. The remaining monthly energy shapes are developed through professional judgment by using historical monthly to annual relationships.

The forecast of the highest one-hour peak demand is derived through the use of seasonal peak models (winter and summer equations), in which January is assumed to possess the highest one-hour winter peak demand, and July the highest one-hour summer peak demand for the forecast. The remaining monthly peaks are shaped from the seasonal peaks using historical averages. Because MPC is a winter peaking utility, the highest one-hour peak demand is assumed for forecasting purposes to occur in January, and this becomes the annual peak requirement.

At this point, the five annual sector sales are divided into numerous revenue classes for use by the Financial Planning and Regulatory Affairs departments. These are broken down by an extrapolation of recent historical trends and judgment. They are used primarily for short-run rates and financial planning purposes.

Load decreases resulting from Demand-side Management (DSM) programs are handled in two ways. First, for rate and financial purposes, the program estimates are subtracted from sales projections. Estimates of future revenues are then developed from these load numbers. Because DSM programs will produce load reductions and subsequent effects on revenues actually realized by MPC, these are the numbers used for financial and rate planning in the short-run business plans.

For resource planning purposes, a second approach is used. Load decreases from DSM are not subtracted from the load projections. Rather, DSM is treated as a resource used to meet the projected load. The methods used to define the DSM resource are further explained in Section 2.1.

1.2 Risk and Uncertainty

MPC's forecast of electricity need focuses on several possible futures. Three scenarios are anticipated due to varying economic, demographic, and other exogenous (independent) influences that may affect the consumption of electricity. The three possible energy-requirement scenarios are illustrated on Figure 1 in Attachment A, and the peak forecast scenarios are shown on Figure 2 in Attachment A. The scenarios include the business plan (base case) forecast and the high and low cases. The high case is the result of optimistic projections of

the input variables and primarily defines MPC's resource responsibility in a high-growth environment. This scenario includes extended sales in the Contract Industrial class with no customers leaving the system during the forecast. Similarly, the low case outlines the projected low-growth rates associated with a continually depressed or slightly growing service territory economy. While it is presumed that the high and low cases provide adequate upper and lower bounds for MPC's forecast, extreme economic conditions could exceed the cases outlined. The base case is MPC's business plan forecast, or most likely scenario.

Probability values were assigned to the three scenarios through a delphi technique. The inputs of each scenario were examined by the load forecasting staff and were assigned a probability of occurrence. These were then aggregated by scenario and assigned the overall probability for the base, high, and low cases. The base case was determined to have a 59% probability of occurrence while the low case and high case have 21% and 20% probability, respectively.

1.3 Assumptions

MPC's load forecast incorporates many relationships between variables. The following sections describe the input variables that drive the sales forecast models.

1.3.1 Population

The population of MPC's service territory is influenced by economic and demographic trends of the state. Employment by Standard Industrial Classification (SIC) code, birth, mortality, migration, unemployment, and participation rates are all used to develop the population cohort-survival model estimates used in the econometric models. These are developed by using federal and state data that are continuously monitored to produce a state population forecast. This value is allocated to MPC's service territory through the historical relationship between the state and service area population. The relationship between service territory population and state population is developed through historical relationships and professional sources.

Historically, MPC's service area population has grown at about 0.63% per year. However, the long-term base case forecast shows the overall population growth rate dropping to about 0.62% per year. The forecast growth is less than the growth experienced in the 1970's when high oil prices and general conditions promoted population growth in Montana. After five years of population decline in the late 1980's, Montana's economy is showing signs of growth; consequently, this has been incorporated into the long-run forecast.

The base case forecast is broken into three sections: the short-term, medium-term, and long-term. The short-term reflects good growth in employment in most of Montana's industries. The medium-term calls for a reduction in employment in the wood products and mining industries due to timber shortages and suppressed mineral prices, which has the effect of slowing the growth in population. The long-run reflects stabilization of employment in the wood-products industry and new mining activity coming on line. Overall, the forecast reflects a return toward normal long-term conditions for the state. MPC's high case forecast assumes a strong domestic economy with consistent, high growth. The low case forecast assumes a stagnant Montana economy with little or no short-term growth. The population scenarios are shown in Figure 3 in Attachment A. Historical and forecast base case values are depicted in Table 1 in Attachment B.

1.3.2 Nonfarm Disposable Income

The first step in forecasting income is modeling total Montana employment by SIC code. Average labor income per worker by SIC code is used to determine Montana labor income through use of national forecasting services. A ratio of labor income to personal income on a national level is applied to Montana personal income. The same method is applied to the forecast of Montana personal income to develop disposable income. Montana disposable income is then broken down between farm and nonfarm disposable income. The resulting nonfarm disposable income is used in MPC's forecasting process. This figure is used to limit the wide fluctuations of harvests and weather, which tend to influence the farm sector's income.

MPC's base case forecast for income, shown in Figure 4 in Attachment A, grows slightly slower than historical rates due to many of the same reasons outlined for population. The high-case forecast assumes strong growth in state-wide employment for the determinants of income, and the low-case forecast assumes that low historical short-run growth periods will be repeated for the long-run forecast. The historical and forecast values are outlined in Table 1 in Attachment B.

1.3.3 Industrial Production Index

The Industrial Production Index is one of the primary drivers in the Industrial Sales class. Since Montana's industrial sector is mainly influenced by the national economy, the Industrial Production Index from Data Resources Incorporated (DRI) are used as a proxy for the demand conditions faced by Montana's industrial producers. The high

and low cases are also taken from DRI's optimistic and pessimistic scenarios.

As shown in Figure 5 in Attachment A, the base case index shows slower growth when compared to the historical trend. This implies a slight slowdown in industrial production on a national scale. The high-case index shows more optimistic growth and a continuing of the productivity gains made in the 1980's. The low-case index reflects a more dismal U.S. industrial output on an international scale for the long-run future. The historical and forecast values are outlined in Table 1 in Attachment B.

1.3.4 Price of Electricity

Historical electricity price is calculated in the form of the typical bill faced by consumers in each major class by various consumption levels. Typical consumption levels are multiplied by the existing rate schedule in effect at that time.

Forecast prices are taken from the integrated least cost resource planning model PROSCREEN. The value used is the yearly percentage change in the cost of electricity to the consumer. This percentage change is applied to the typical bills through the medium term. Afterwards, the price of electricity is assumed to grow with the rate of inflation or the implicit price deflator for domestic demand consumption. Thus, the forecast price of electricity shows no change in real terms after the year 2000, which is illustrated in Figure 6 in Attachment A. The historical and forecast values are outlined in Table 1 in Attachment B.

1.3.5 Weather

Weather plays an important role in the consumption of electricity, especially in the residential and commercial classes. It is, however, an extremely volatile exogenous variable. MPC accounts for weather in the form of heating degree days, which is simply a base temperature of 65 degrees minus the average daily temperature, summed for the entire year. Thus, for each degree below 65, a degree day is established. Degree days are used as exogenous variables in the sales models as well as the load models. MPC's weather data are weighted by annual electric division sales in historical time periods and assumed to be normal for the forecast. This data are shown in Table 1 in Attachment B, and illustrated in Figure 7 in Attachment A.

1.3.6 Wholesale Price Index and Implicit Price Deflator

Income and prices in the residential and commercial models were deflated by the implicit price deflator for domestic demand consumption from Data Resources Incorporated (DRI). Prices in the industrial model were deflated by the Wholesale Price Index from DRI. This transforms income and prices from nominal to real terms.

1.3.7 Electric Space Heat Saturation

Space heat saturation is the percentage of MPC's residential customers whose primary source of heat is electricity. Historically, MPC's saturation level has been well below that of neighboring or even other national utilities. Strong growth was seen in the 1970's and continued into the 1980's; however, this trend appears to be leveling off. The main reason for the change in saturation level appears to be a shift towards heating with competing fuel sources. MPC does not currently foresee any drastic changes in this situation. Information is derived from residential surveys performed approximately every three years. The survey values and forecast are listed in Table 1 in Attachment B, and illustrated in Figure 8 in Attachment A.

1.3.8 Fuels Producer Price Index

The Fuels Producer Price Index is the index of prices for fuel and power from DRI. The index captures some of the marginal costs of electricity production for the Industrial Class. Historically, fuel prices declined in real terms during the 1960's. During the Arab oil embargoes of the 1970's, prices increased rapidly. The 1980's saw an almost equally rapid decline in prices with a slight upturn into the 1990's. The base case forecast shows continued steady growth. The forecast values for the high and low cases utilize the percent change in DRI's optimistic and pessimistic estimates of foreign crude oil prices per barrel. The index incorporates a trend projection that assumes oil prices, in nominal terms, will climb from $23 per barrel in 1995 to $86 per barrel by 2016. The low-case forecast shows a continued short-term price decline, a slow increase, and then a leveling off. The low-case forecast assumes foreign crude oil at $56 per barrel by 2016. The high-case shows a rapid growth consistent with high historic rates as seen in the 1970's and assumes a trend in oil prices that reach $136 per barrel by 2016. The three scenarios are illustrated in Figure 9 in Attachment A.

1.4 Model Estimation

MPC forecasts electric sales and demand through the use of models. These models estimate the coefficients of economic relationships through econometric analysis. Econometrics is an extension of regression analysis where economic theory, mathematics, and statistical techniques are used to estimate relationships between historical and forecast data.

Residential sales estimates are based on population, income, the price of electricity, weather, and the percentage of electrically heated homes on the system. Commercial sales are dependent on population, income, price of electricity and the weather, along with the expected value of past consumption levels. Industrial sales depend on national production, price of electricity, price of other fuels, and historical consumption levels. The rural electric cooperatives sales are dependent on a ratio of MPC's residential and commercial sales.

Sales are aggregated to an annual total system basis, and losses are modeled. Losses are the difference between total sales at the customer's meter and load at the generator. Annual energy becomes sales plus losses. Monthly energy is shaped from annual energy, historical monthly energy, and weather. Monthly peak is calculated from monthly energy and weather.

A more detailed technical specification of the models utilized in the forecast process is contained in Attachment C, Model Specifications.

1.5 Forecast Results

Figure 10 in Attachment A shows the results of MPC's 1993 Business Plan forecast of sales by class and total. Total sales show a forecast growth rate of 1.4%, compared to a historical rate of 3.2%. Total sales, which historically grew at rate of 17.2 average MW per year, are expected to grow at about 16.5 average MW per year. This difference is due to a slightly slower growth in the economic conditions that have traditionally driven Montana's economy and, therefore, influence MPC's electricity demand. Figure 11 in Attachment A shows the percent of sales by customer class for the years 1992 and 2002. Sales, energy, and peak load by class for base, high, and low cases are outlined on Table 2 in Attachment B. Base case sales are summarized by class below.

1.5.1 Residential

Historical growth of 4.8 average MW per year could be attributed to a combination of decreasing electric prices, an increase of household electric appliances, and statewide growth. The forecast growth of 4.0 average MW per year can be attributed to continued steady growth in

Montana's economy, and also a stabilizing percentage of electrically heated homes and more efficient appliances.

1.5.2 Commercial

Increasing office and commercial establishment automation, new business creation, and increasing use per customer have contributed to a healthy 6.0 average MW per year historical growth rate. While some of these factors may slow in the future, MPC does not foresee drastic changes because growth is expected to continue at a slightly slower rate of 5.5 average MW per year.

1.5.3 Industrial

Although a reduction in sales was experienced in 1991, growth in this class has been robust in recent years with an overall historical increase of about 1.8 average MW per year. Strength in small mining operations in the long-run, and growth in industrial production on a national and state level is anticipated as this class is forecasted to grow at about 2.6 average MW per year. Historically, several smaller industrial customers have grown to now be contract industrial customers.

1.5.4 Contract Industrial

This sector is forecast through a customer questionnaire. Forecast growth is limited to that outlined by the individual customers and loads anticipated in the near future. This sector grew at a rate of 3.5 average MW per year, even with the closure of the Anaconda Company in the 1980's. Future growth is expected to continue at about 1.1 average MW per year, with some loads leaving the system and new loads expected to come on line during the forecast. The uncertainties this customer class bring to the plan are many, and the change in electric resource requirements can be profound.

1.5.5 Other

This class includes lighting, irrigation, special contracts, and REC sales. Generally, a growth of 1.6 average MW per year reflects MPC's historical system growth. While most of the sectors in this class are stable, the REC's follow the Residential and Commercial classes for a forecast rate of about 1.1 average MW per year.

Figure 11 in Attachment A, shows sales as a percent of total by class for the years 1992 and 2002. A trend is being established in which the Commercial and Industrial classes are predicted to capture a greater percentage of total sales, whereas the Contract Industrial class and Other are anticipated to see a reduction in their percent of total sales. The Residential class is anticipated to remain stable in terms of its percent of total sales throughout the forecast.

1.5.6 Total Sales, Energy and Peak

Total sales and energy loads historically grew in the 3.0% to 3.2% range. The 1993 forecast shows a growth rate for sales and loads of approximately 1.5%. The forecasted growth is approximately 3 average MW per year less than the annual historical growth in terms of both total sales and energy. In terms of total sales, the forecast growth is less than historical due to slower growth anticipated in the Contract Industrial, Residential, and Other classes. Annual energy is determined as a function of total sales, and thus responds in a similar fashion. Historically, peak loads grew at 26.4 MW per year. The forecast calls for peak loads to remain near historical levels with anticipated growth of 25.8 MW per year. Historical and forecast values are shown in Table 2 in Attachment B.

The historical and forecast values of energy and peak loads by month, along with the load factors are shown in Table 3 in Attachment B. The annual load factors are determined by the ratio of energy to peak and represent the ratio of the average annual load to the highest 1 hour peak or maximum load occurring in that year.

1.6 Treatment of Demand-side Management (DSM)

The commitment to DSM programs and DSM planning has increased recently at MPC. Plans for programs and the data generated from them will significantly impact loads and the load forecast. There are two areas where DSM will affect the forecast. The first is how programs have influenced historical sales and loads. The second is how DSM will affect load shapes and forecast totals in the future.

The historical data in Table 2 in Attachment B, has not been adjusted to accommodate any changes due to DSM programs. Program impacts have not been significant enough to affect loads to this point.

The forecast loads in Table 2 in Attachment B, are also not adjusted to account for DSM programs. DSM, which is discussed in Section 2.0, is used as a resource to meet the loads forecast here.

2.0 DEMAND-SIDE RESOURCES

In 1991, MPC completed its first complete Integrated Resource Planning (IRP) Cycle fully integrating Demand-side Resources (DSR). This planning cycle is explained in the *Load Forecast and Integrated Least Cost Resource Plan*, which was distributed in March 1992. The history and background information regarding the evolving DSR acquisition process is also included and shown in great detail.

During 1992, MPC continued to "ramp up" its program activities to match a path of capacity and energy acquisitions consistent with the levels determined in the 1991-1992 planning process. This task included adding additional staff dedicated to the acquisition of DSR and refining a formal process to respond to changing data and market conditions.

This process and the efforts undertaken by MPC since its last resource plan publication are described below and illustrated in Figure 12 in Attachment A.

Throughout this period of DSR development and refinement there is a driving force one must keep in mind; **MPC is committed to acquire all cost-effective conservation in a manner that is consistent with the ILCP guidelines, as long as appropriate cost recovery is allowed by the Commission, including lost revenues.**

2.1 The DSR Acquisition Process

The following explains each step of the Demand-side Management Resource Acquisition Process and how they interact with each other.

2.1.1 Build Prototypes

To determine the amount of conservation potentially available on MPC's electric system, it is necessary to compare the relative efficiency of existing structures to the possible characteristics of MPC's loads with DSR technologies applied. Through surveys and on-site audits, MPC has collected a considerable amount of data on its customers and the nature of their loads. This data has been condensed into a number of prototypical building descriptions to simplify the DSR assessment.

MPC has developed five prototypes that represent its residential sector and eight building prototypes associated with its commercial sector. Each prototype provides a base case, or starting point, from which numerous energy conservation measures (ECMs) are modeled to estimate potential savings.

The building data used to develop the prototypes are reviewed and updated as necessary. Because construction practices, customers' life style preferences, and the saturation of efficient technologies change

style preferences, and the saturation of efficient technologies change over time, MPC must ensure that the prototypes are up-to-date and that the prototypes accurately represent their customers' practices. This is accomplished by performing ongoing surveys, conducting on-site audits, and reviewing trade journals.

2.1.2 Incorporate System Data

In addition to understanding the individual characteristics of customer facilities, it is also necessary to know the number of customers within each group and their typical consumption patterns. Timely information from MPC departments such as Load Research (metered data and load factor data bases), Market Research (surveys and customer statistics), Load Forecasting (projected number of customers, future average consumption), and the Customer Information System (actual and historical consumption data) is critical to the definition of potential DSR.

2.1.3 Study DSM Technologies

MPC regularly reviews product literature defining the cost and availability of technologies that increase the efficiency of electrical loads. MPC maintains data on the latest DSM technologies and their costs and benefits through networking with surrounding utilities and assessing the Electric Power Research Institute's (EPRI's) information data base. MPC collects data on local installation and maintenance costs and the availability of designers, installers, and maintenance professionals. Key information such as life of an installed measure (i.e., lighting 5 years, insulation 20 years), installation costs, and market prices is monitored during program implementation.

2.1.4 Build and Operate Simulation Models

Building data prototypes, incorporating system data, and studying DSM technologies are all integral parts of the information data base upon which MPC operates its simulation models. MPC currently uses SUNHOUSE and TRACKLOAD energy analysis simulation models to provide energy (kWh and therms) impact analyses. These are combined with load shapes characterizations previously provided by Barakat and Chamberlain, Inc. (BCI). This information ultimately is combined in a format that permits evaluation of DSR's within the framework of PROVIEW, a resource planning model used by MPC.

Temperature data used in the Load Forecast and in DSM analysis are taken from national weather stations located in Montana.

BCI load shape data characterizes demand impacts of conservation measures and enables PROSCREEN, a resource planning model used by MPC, to value both peak and energy of a demand-side resources simultaneously with supply-side resources.

The 168 hour typical week DSM profile for each month is subtracted from the typical week load profile to develop the load shape that will be met by supply-side resources. The BCI load shape for the DSM resource and the system load shape are shown in Table 17 in Attachment B. A discussion of the BCI load shape for DSM can be found in the *1992 Load Forecast and Integrated Resource Plan, Volume 2 - Static Analysis*. This is a key element of the dynamic resource integration process.

As MPC's experience and knowledge in DSM analysis continues to grow, numerous areas such as temperature variance and customer diversity will be considered. Recently, MPC acquired EPRI's DSManager to expand the load characterization and to provide a library of load shapes by end-use for extensive analysis. MPC periodically evaluates the latest simulation models to keep abreast of this critical but ever changing area of engineering energy analysis simulations.

2.1.5 Develop Supply Curves

The simulation models are used to evaluate the impacts of ECMs applied to the prototypical buildings. The savings predicted by the models are compared to the costs of the ECMs to develop a set of curves that relate the cost per kWh of energy savings to the incremental amount of savings acquired from each ECM applied to the prototype.

2.1.6 Create Program Templates

A template is a spreadsheet that enables MPC to combine the costs and savings from the supply curves with existing and projected load information, market saturation data, possible penetration rates, and estimates of promotional and administrative costs to define a specific program scenario. The results are a projection of customer costs, utility costs, energy savings, and demand savings for the resource planning horizon. This information is combined with a corresponding set of hourly impact data to feed directly into the resource planning process for evaluation.

In the 1992 Resource Planning Cycle, ten different template results were submitted with supply-side resources for evaluation. After months of analyzing many different resource plans containing combinations of

demand and supply-side resources, four template results were selected. The templates selected were the Residential low-cost Standard, Commercial Accelerated, Industrial Standard, and Contract Industrial Accelerated, collectively referred to as the SASA total DSM package.

2.1.7 Develop Integrated Resource Plan - PROSCREEN/PROVIEW

The output from the program templates is fed into the Load Forecast Adjustment (LFA) module of PROSCREEN/PROVIEW, a resource planning optimization model used by the Resource Planning Department. PROSCREEN/PROVIEW is used to evaluate the effects of multiple combinations of supply and demand-side resources under several load growth scenarios.

The initial set of templates that are passed to the resource planning model are screened against the default tariff avoided costs to define a set of programs where the most expensive ECMs cost no more than 115% of the resource avoided cost. A feedback loop is established so changes can be made to the ECMs within each program during the optimization process, and the corresponding impacts can be downloaded to the LFA. Through this dynamic process, the set of ECMs that contributed to the most robust resource plan can be identified.

This process is also used to optimize the rate at which the individual programs are "ramped up". Faster ramp rates result in an increase in unit costs for the ECMs. This increased cost is balanced against the increased value resulting from the accelerated timing of the resource acquisition.

2.1.8 Develop a Least Cost Plan

Once the demand-side resources program scenarios are optimized coincident with the supply-side alternatives and the resource plan that fits the most probable future is selected, the plan is used as an action plan; and programs are developed or continued accordingly. Because DSR programs are flexible, we anticipate adjusting the action plan over time.

2.1.9 Implement Programs

In 1991, MPC had 8 DSM programs. However, many of these were changed, as described below; and currently, MPC has 11 DSM programs that it offers to its customers under a new logo referred to as Efficiency Plus.

1. The "Montana Commercial Structures Program" and the "Electric Conservation Purchase Program" were combined under the "Efficiency Plus Business Partners Program."

2. The "Energy Savings Plan II" were replaced by the "Efficiency Plus Audit Program (Residential)."

3. "Commercial Audit Program" were renamed the "Efficiency Plus Audit Program (Commercial)."

4. The "Low Income Weatherization Program" name was shortened to "Free Weatherization."

5. The "Super Good Cents Program" remains unchanged.

6. The "Residential Heat Pump Program" is now referred to as the "Efficiency Plus Heat Pump Program."

7. The "Commercial Motor Program" is now called the "Efficiency Plus Motor Rebate Program."

8. The "Residential Energy Efficient Lighting Program" is now referred to as the "Efficiency Plus Lighting Program (Residential)."

9. The "Commercial Lighting Program" is now referred to as the "Efficiency Plus Lighting Program (Commercial)."

Two additional programs will be implemented in 1993. These programs will target:

10. Efficiency of residential electric water heating, and

11. Irrigation systems.

Additional details on all programs can be found in Attachment D.

2.1.10 Monitor Programs

The purpose of the monitoring programs is to estimate the quantity of energy and peak-demand savings based on engineering estimates of impacts combined with the number of units that participated in a particular program. Monitoring information is used to quickly check program performance against program projections. MPC maintains several databases that contain participant information, ECMs installed, costs, and estimated impacts.

Through this monitoring, MPC can determine where the programs are successful in getting technologies delivered to the customer and where more attention is needed. MPC uses rapid feedback from its monitoring to periodically revise the programs so they become more comprehensive and cost-effective. Also, MPC can monitor customer satisfaction with the programs and provide reliable information for ongoing planning efforts.

2.1.11 Evaluate Programs

MPC has a separate evaluation plan for each program to determine whether the program goals are met. The tools employed for evaluation vary among programs; however, they include the use of comparison or control groups; statistical analysis of billing records; use of telephone and mail surveys; personal interviews; focus groups; computer simulation; demand metering; and end-use metering.

Detailed evaluations are conducted to quantify the impacts on MPC's electrical loads and to determine the cost-effectiveness of a program. MPC also examines the effectiveness of each program in achieving customer participation, achieving net reductions of kWh and kW consumption, allocating appropriate costs to participating customers, and controlling the total cost of the resources acquired.

The evaluations provide a sound basis for expanding successful programs, refining or curtailing less effective ones, and designing new programs. Multi-year analyses, to determine whether the quantity of savings changes over time, contribute to MPC's ability to recognize more accurately the long-term impact of DSR programs on MPC's loads.

2.1.12 Incorporate Feedback

One of the most important parts of the DSR acquisition process is that it must allow information, statistics, and data gathered and analyzed to be tied back into the planning and optimization process in a timely manner. This concept is called **feedback.**

Data collected during program implementation are evaluated and compared to the estimates and assumptions used during the planning and program design processes. These assumptions and estimates may need to be adjusted as new information becomes available.

The cost and savings of ECMs applied to prototypical buildings are eventually replaced with actual performance data collected from actual

installations. The load forecast and the customer information database are influenced over time by the results of the DSR programs. Assumptions about the possible rates of program acceleration or penetration and the resulting cost implications are modified as new information becomes available. Building prototypes are modified as building characteristics change over time or as new audit data becomes available. Engineering estimates of ECM impacts are adjusted to reflect information from impact evaluations.

2.1.13 Analyze the Results

The optimized set of programs for DSR was presented in the *1992 Load Forecast and Integrated Resource Plan*. Since that document was published, MPC's efforts have focused on the design and implementation of DSR programs and the design of its monitoring and evaluation plans.

During 1992, each template was updated to reflect the latest load forecast information as well as updated ECM information. The results were very similar to those submitted in last year's planning process. For detailed information, refer to the Technical Appendix, Volume 2, Static Analysis, Section III, Attachments B through E, of the *1992 Load Forecast and Integrated Resource Plan*.

3.0 INTEGRATED LEAST COST PLANNING PROCESS

This section contains detailed work papers that supplement the information in the *1993 Load Forecast and Integrated Least Cost Resource Plan* (1993 ILCP). All tables discussed in this section are located in Attachment B - Tables.

3.1 1992 Load Forecast and Integrated Least Cost Resource Plan

Table 4 in Attachment B, displays MPC's first Integrated Least Cost Resource Plan (ILCP). This plan was published in March 1992 and provided the starting point for the 1993 ILCP. MPC's Forecast Firm Energy and Peak Loads, in average MW and MW and from 1990 to 2015, that were used in the 1992 ILCP are shown in Table 5 in Attachment B. The resources from the 1992 ILCP that were included in MPC's 1993 ILCP are shown on the load and resource tabulations for energy and peak in Table 4 in Attachment B.

3.2 Off-System Sales Forecast

Table 6 in Attachment B, outlines the off-system rate forecast numbers and work paper used to generate Illustration 34 in the *1993 Load Forecast and Integrated Least Cost Resource Plan*. The 1992 base case forecast was used in the 1993 ILCP process until the 1993 base case forecast became available. The 1993 base case forecast was used in the Phase 2 Risk and Uncertainty Analysis.

3.3 Static Analysis - Phase 1 Screen

A summary of the resources, including multiple options for a single resource, that MPC received from the all-source competitive bid solicitation is shown in Table 7 in Attachment B. The Phase 1 Screen reduced the Request For Proposal (RFP) resources to 36 (35 supply-side and 1 demand-side resources). The RFP resources are ordered by screening ratio in Table 7 in Attachment B, which shows the EEAF as proposed by the resource sponsors. Note that the screening ratio is the same as "Ratio 2" in the *1993 Load Forecast and Integrated Least Cost Plan (ILCP)*, Section 6.3.2.1.

3.4 Static Analysis - Phase 2 Screen

The Phase 2 Screen used four different "R" ratios. (See Section 6.3.2.2 of the 1993 ILCP.) Table 8 in Attachment B, outlines the four "R" ratios and how the resource ranking changes with different "R" ratios. Table 9 in Attachment B, displays the 21 resources that remained on the working list of resources after the Phase 2 Static Analysis. Information that also went into the screening process was the pricing as reviewed by MPC and the EEAF's as calculated by MPC.

Table 10 in Attachment B, illustrates MPC's EEAF; the price is not shown because of the proprietary nature of the data.

3.5 Dynamic Analysis - Step 1

As mentioned in Section 6.4.1. of the 1993 ILCP, the remaining 15 working list resources were used to build 128 resource plans. Table 11 in Attachment B, outlines the 128 resource plans. There are four letters in the first column (i.e., AAAA or SASA). These letters represent the MPC DSM program package used in each plan. The SASA is the middle acquisition rate, and the AAAA is the high acquisition rate. The second column on Table 11 in Attachment B, is the PROVIEW plan number. The third and fourth column labeled "TPVRR" represent total present value societal total cost from 1991 out to 2006 and 2030 respectively. In the center of Table 11 in Attachment B, are a series of columns representing the resources. A value of "1" or greater means that the resource appeared that number of times in the plan, and a value of "0" means the resource is not in the plan. Note that the squares around certain "1s" represent the first plan in which that resource appears. The last two columns represent the percent increase in long-term revenue requirement (2030) from one plan to the next (in sequence) and the percent difference in comparison to the lowest cost plan.

3.6 Dynamic Analysis - Step 2

Section 6.4.2 of the 1993 ILCP explains that during Step 2 of the Dynamic Analysis, the top 323 resource plans were evaluated. Table 12 in Attachment B, outlines each of the 323 resource plans by plan number, short-term and long-term total present value of societal total cost, and resource. The value of "1" or greater means that the resource appears that many times in the plan, and a "0" means the resource is not in the plan. At the completion of Step 2, 13 significantly different resource plans were selected to be passed to the Risk and Uncertainty Analysis. Table 13 in Attachment B, illustrates the final 13 resource plan annual incremental revenue requirements from 1992 to 2030. Incremental revenue requirements include existing unit production costs and future resource production and capital (or expense) costs.

3.7 Avoided Cost

The avoided costs used for the benefit/cost analysis are based on several cost flows and appear in Attachment E - "MPC 1992 Avoided Costs." The avoided costs used in the ILCP process were derived from the 1992 resource plan. A 20 MW cost decrement (see page 15 of Attachment E) from the company's production costing model (PROMOD) and capital expenditure model (CER) is classified to capacity and energy using the BPA NR capacity rate as the capacity value and the remainder to energy. For the remaining years, an annual nominal

cost comparison (page 16) is made between the cost of a combined cycle unit (page 17) and a pulverized coal unit (page 18) to determine the least cost alternative for any given year, and that cost is the basis of the avoided cost. For the years 2007 to 2025, the combined cycle is the lowest cost. These costs are also classified based on the BPA NR capacity rate.

These nominal annual rates (pages 13 and 14) are then nominally levelized for terms of 1 to 40 years for on line dates of 1993-94 to 2004-05 (pages 1 through 12). For the benefit/cost analysis, the appropriate on line date coinciding with the resource on line date is selected, and then the appropriate contract term is selected. These avoided costs are now the appropriate ones to compare with the resource cost to determine the benefit/cost for the particular resource. The work papers are contained in Attachment E.

3.8 Other Analyses

Other analyses included a look at plans with expected water, no debt equivalent equity (DEE), DSM risk and uncertainty, and the impact of the environmental externality adjustment factor (EEAF). These items are illustrated on Tables 14, 15 and 16 in Attachment B. Each of these tables displays the resource plans using different tests such as plans without Ryan and Thompson Falls ("w/o Ry, T.F."). The "-" to the right of some of the plans shown in Tables 14 and 15 in Attachment B, indicate the plans that passed the dynamic analysis selection criteria. comparing the plans marked by the "-" to similar plans that were selected by the Decision Rule Analysis (shown in Table 12 in Attachment B), shows the impact of Expected Water or DEE on resource selection. Table 16 in Attachment B, shows how the resources within resource plans varied when "SASA," "SSSS," or "AAAA" were used (see the left most column). Note the groups of 3 resource plans on Table 16 in Attachment B, provide the same "TEST" criteria as shown in Table 14 in Attachment B. Attachment F provides a narrative discussion of the EEAF Impact Study. MPC asked Litchfield Consulting Group, Inc. to evaluate MPC's resource evaluation process. Attachment G is the Litchfield report, in its entirety.

3.9 Load Profile

Table 17 in Attachment B, contains the winter and summer typical week load shape profiles for system load and DSM. The DSM load shape profiles include: Residential, Commercial, Industrial, and Contract Industrial. It should be noted that the load shape profiles will be updated as additional information becomes available.

Attachment A - Figures

Figure 1. Energy Forecast Scenarios

Figure 2. Peak Forecast Scenarios

Figure 3. Montana Power Company Service Territory Population

Figure 4. Nonfarm Disposable Income

Figure 5. Industrial Production Index

Figure 6. Typical Bill

Figure 7. Heating Degree Days

Figure 8. Electric Space Heat Saturation

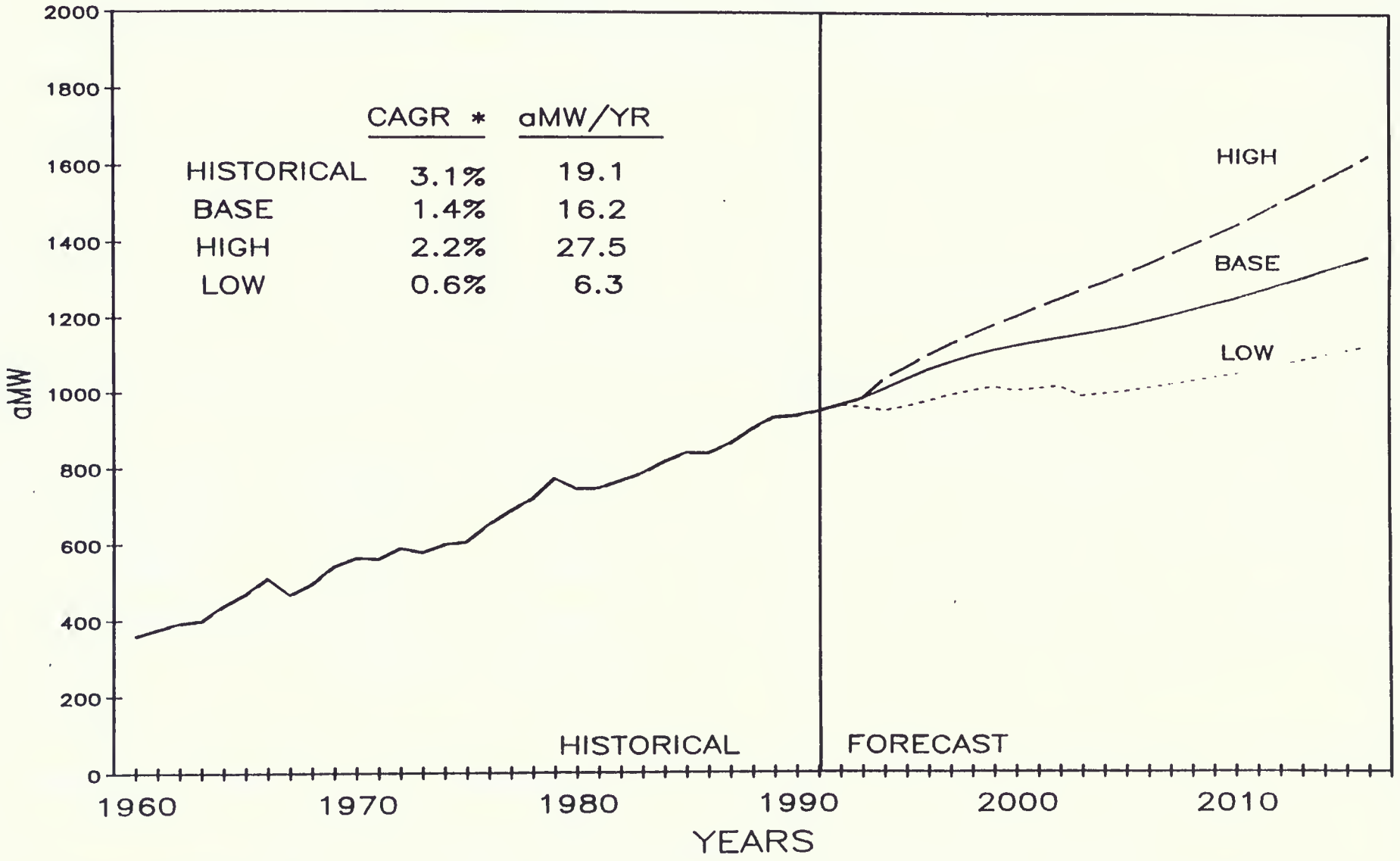
Figure 9. Fuels Producer Price List

Figure 10. Business Plan Sales By Class

Figure 11. Sales by Customer Class

Figure 12. DSM Acquisition Process

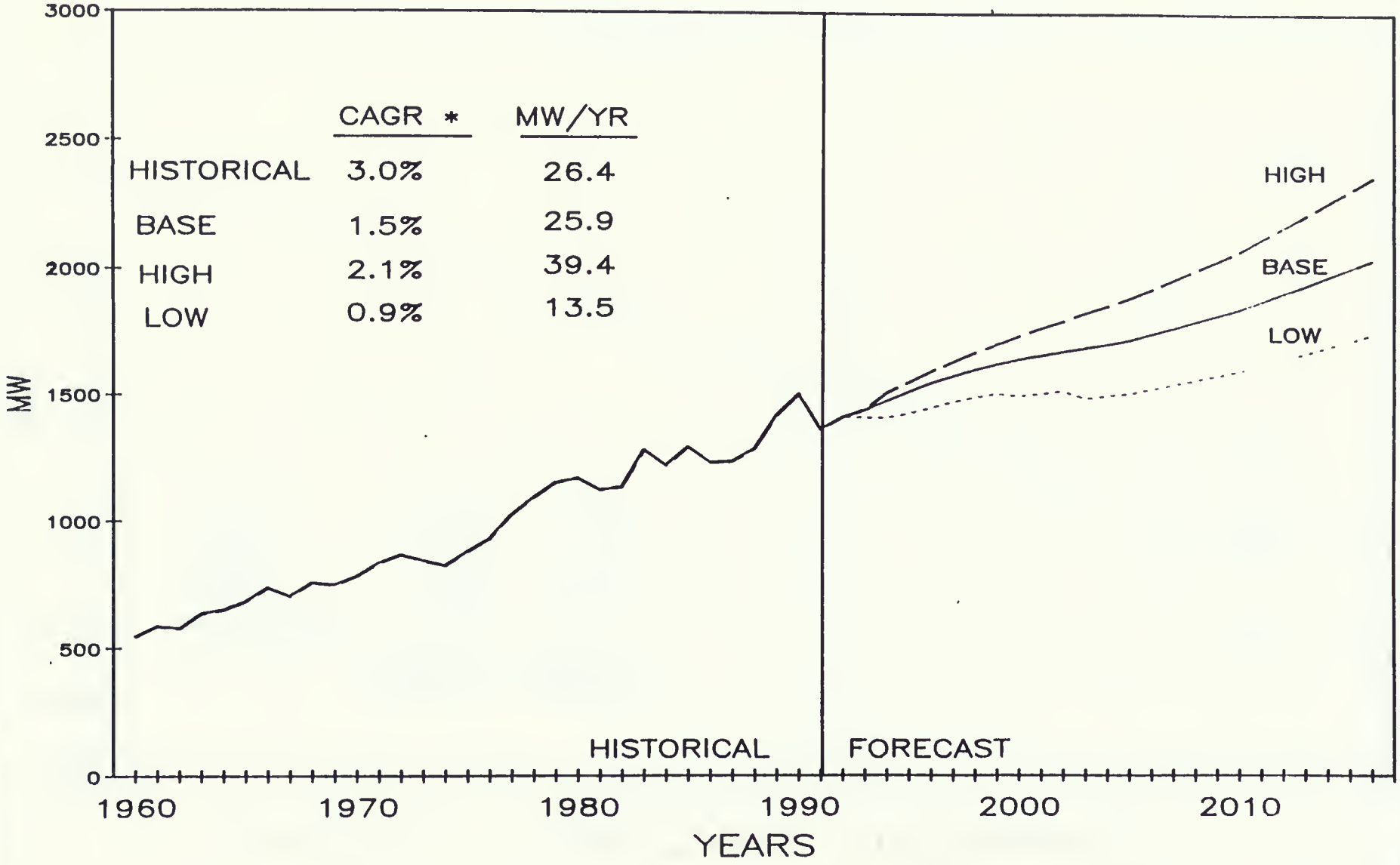
FIGURE 1
ENERGY FORECAST SCENARIOS



* COMPOUND ANNUAL GROWTH RATE

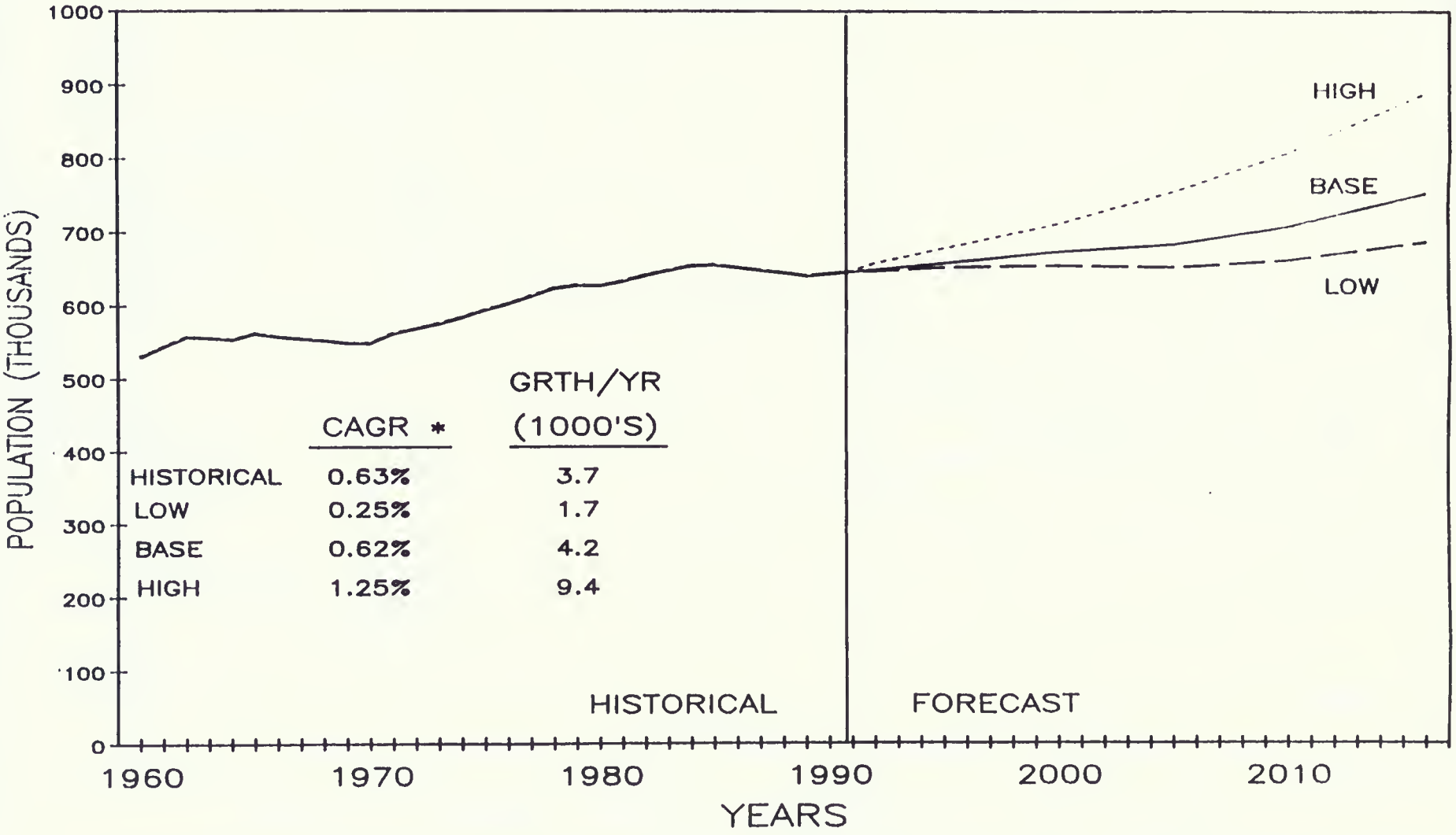
R93 OUTPUTS-BOOK, BOOK.WK1, ENERGY.CHT

FIGURE 2
PEAK FORECAST SCENARIOS



R93 OUTPUTS.BOOK, BOOK.WK1, PEAK.CHT

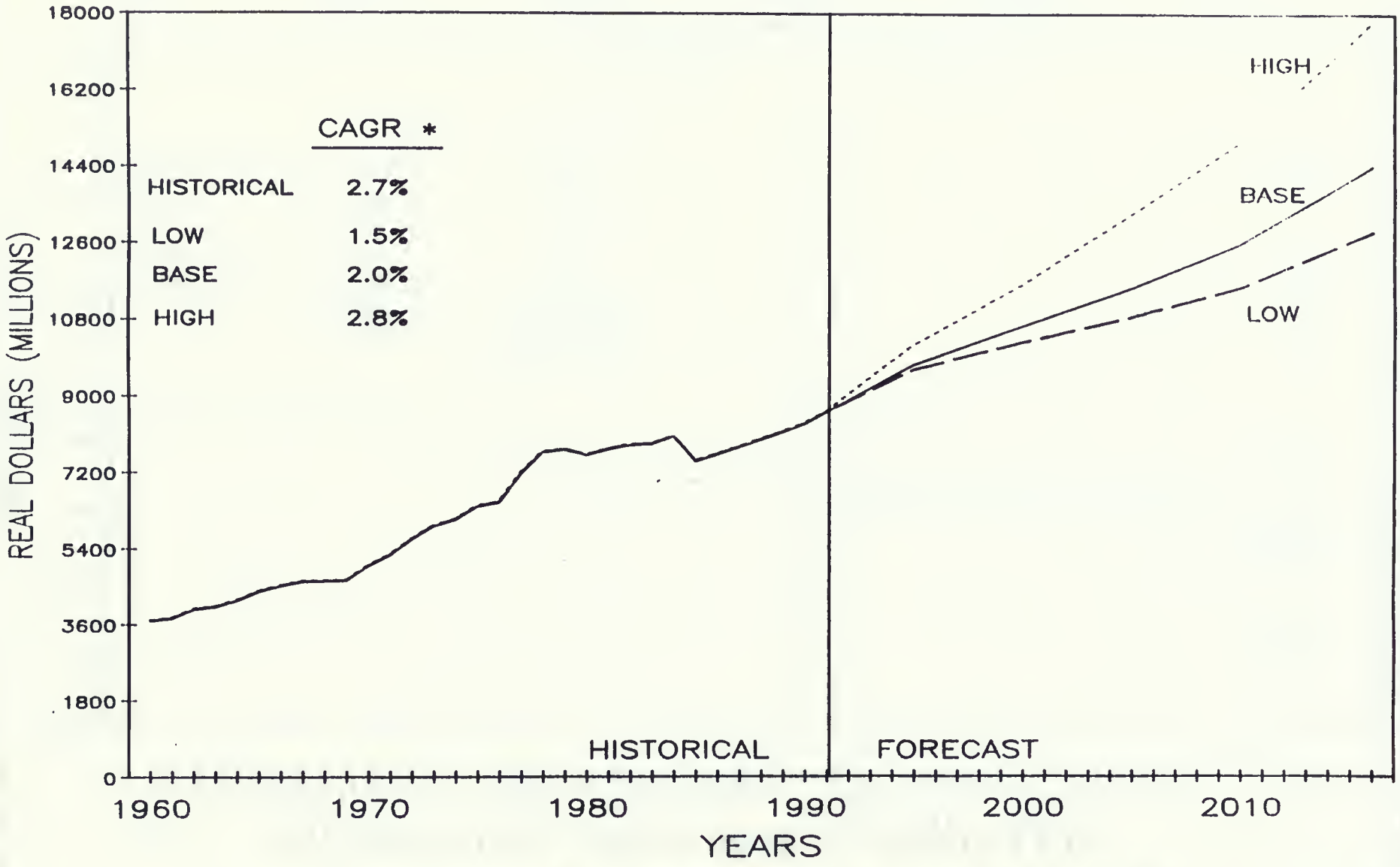
FIGURE 3
MONTANA POWER COMPANY
SERVICE TERRITORY POPULATION



* COMPOUND ANNUAL GROWTH RATE

R93 OUTPUTS-BOOK, BOOK.WK1, POPHILO.CHT

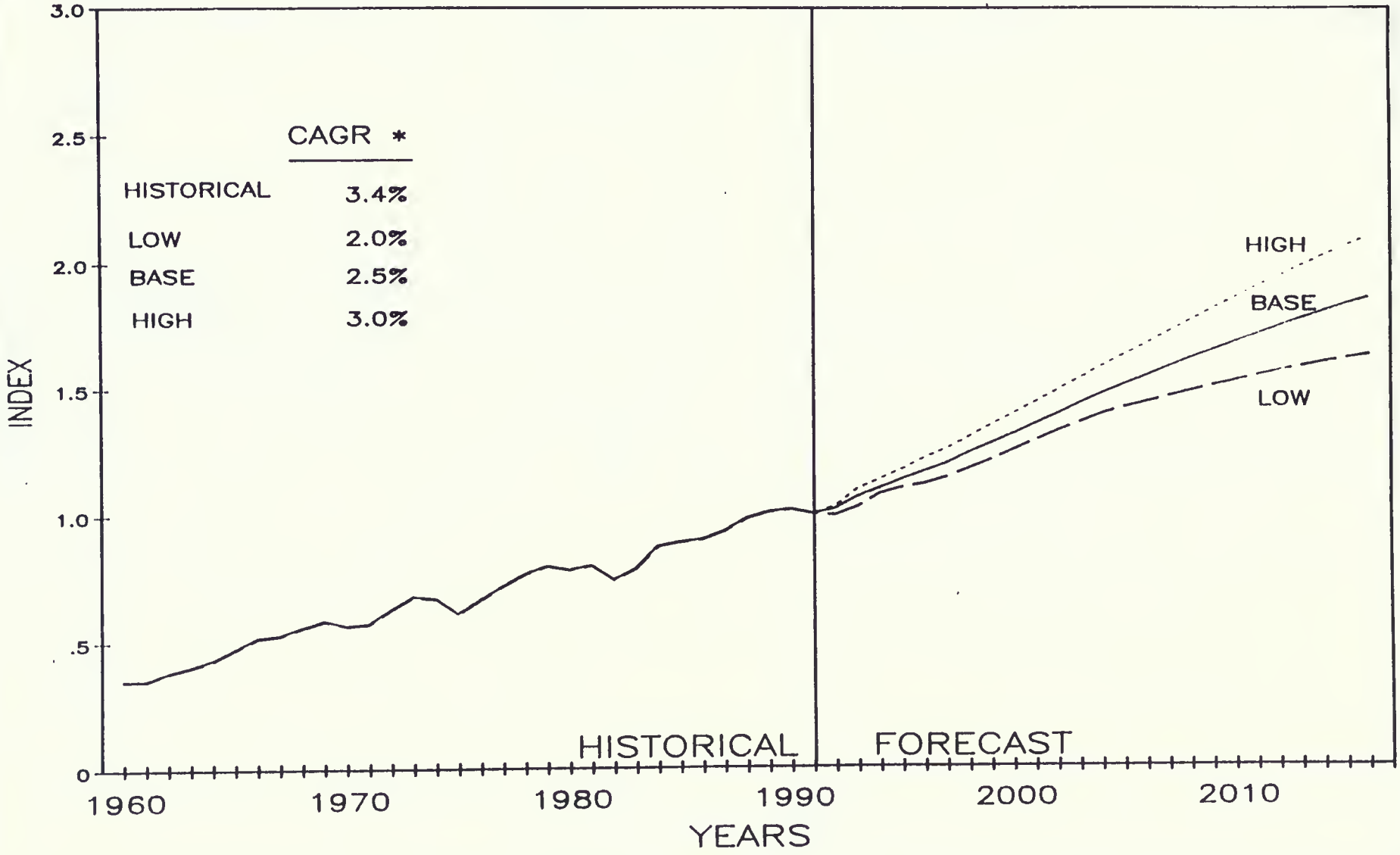
FIGURE 4
NON-FARM DISPOSABLE INCOME



* COMPOUND ANNUAL GROWTH RATE

R93 OUTPUTS-BOOK, BOOK.WK1, !!!CHILO.CHT

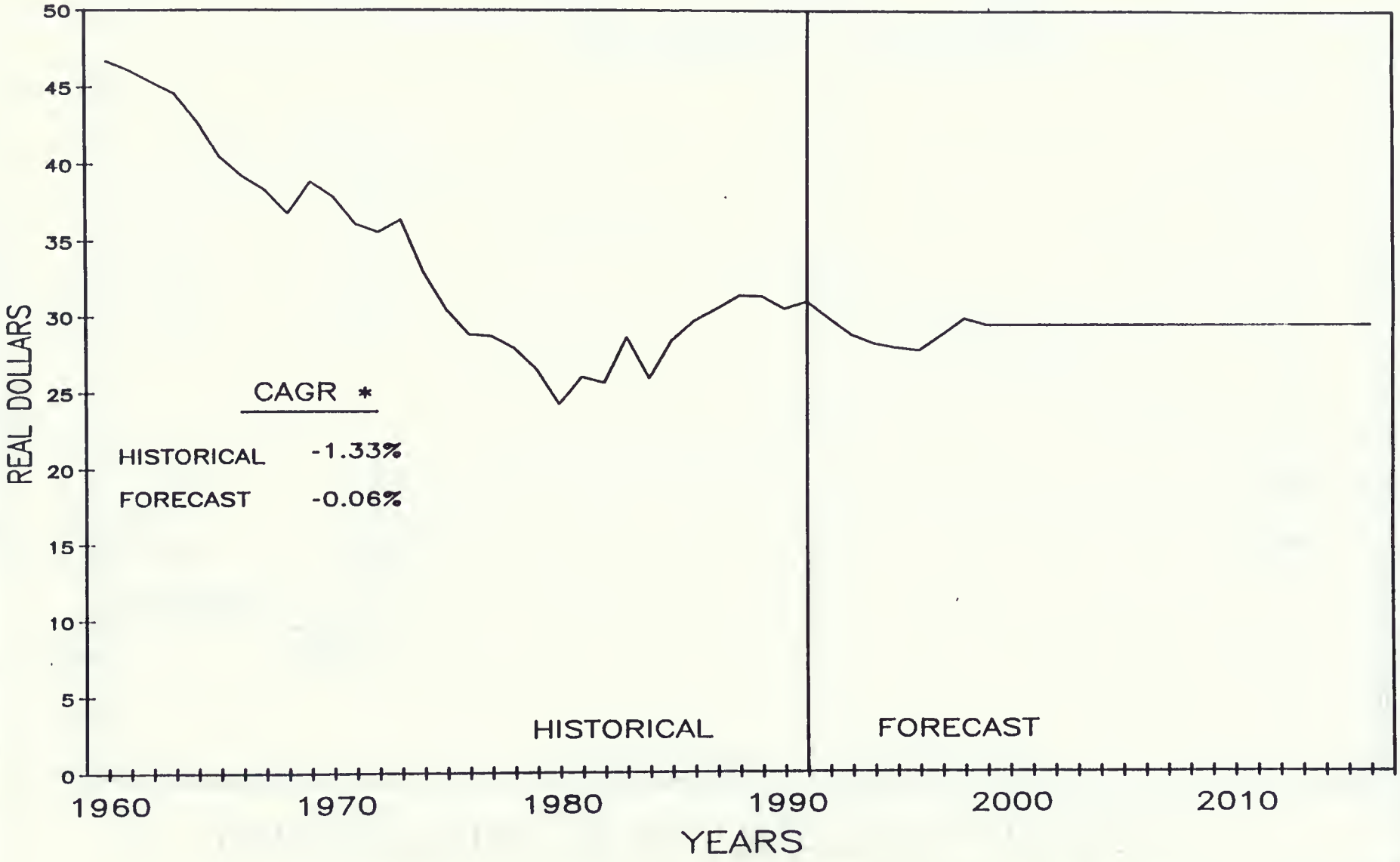
FIGURE 5
INDUSTRIAL PRODUCTION INDEX



* COMPOUND ANNUAL GROWTH RATE

R93 OUTPUTS-BOOK, BOOK.WK1, IPI.CHT

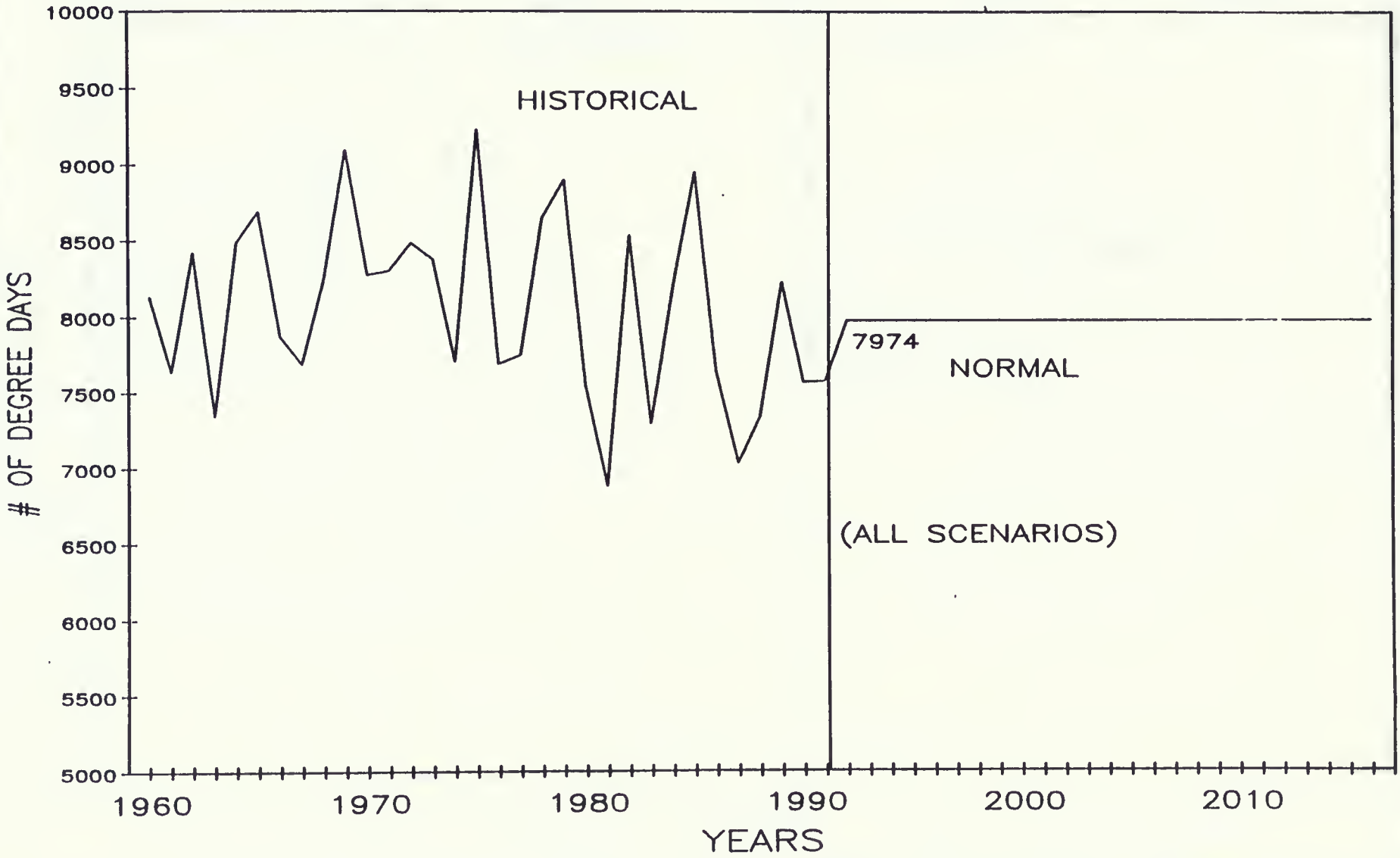
FIGURE 6
TYPICAL BILL



* COMPOUND ANNUAL GROWTH RATE

R93 OUTPUTS-BOOK, BOOK.WK1, BILL.CHT

FIGURE 7
HEATING DEGREE DAYS



R93 OUTPUTS-BOOK, BOOK.WK1, HDD.CHT

FIGURE 8
ELECTRIC SPACE HEAT SATURATION

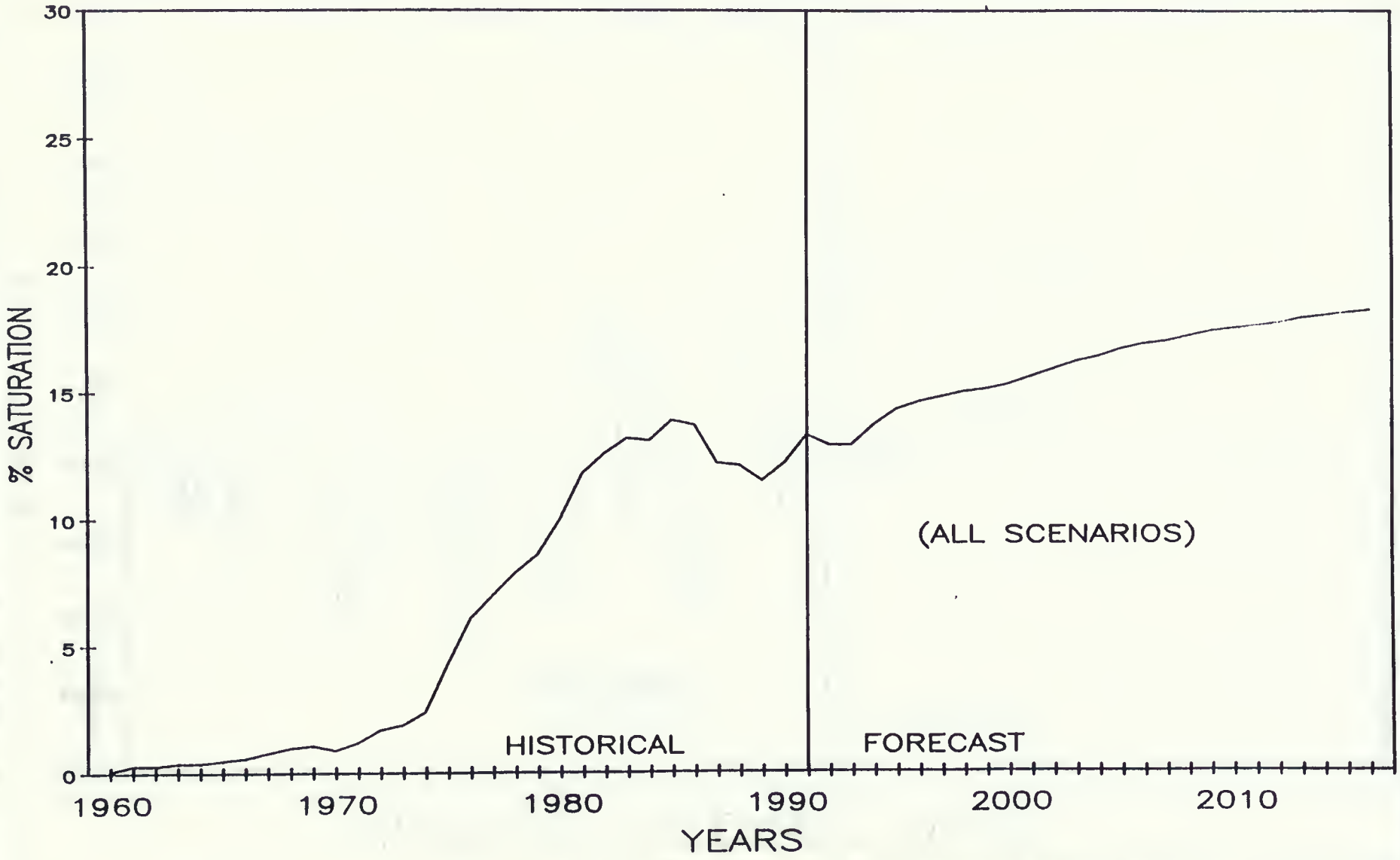
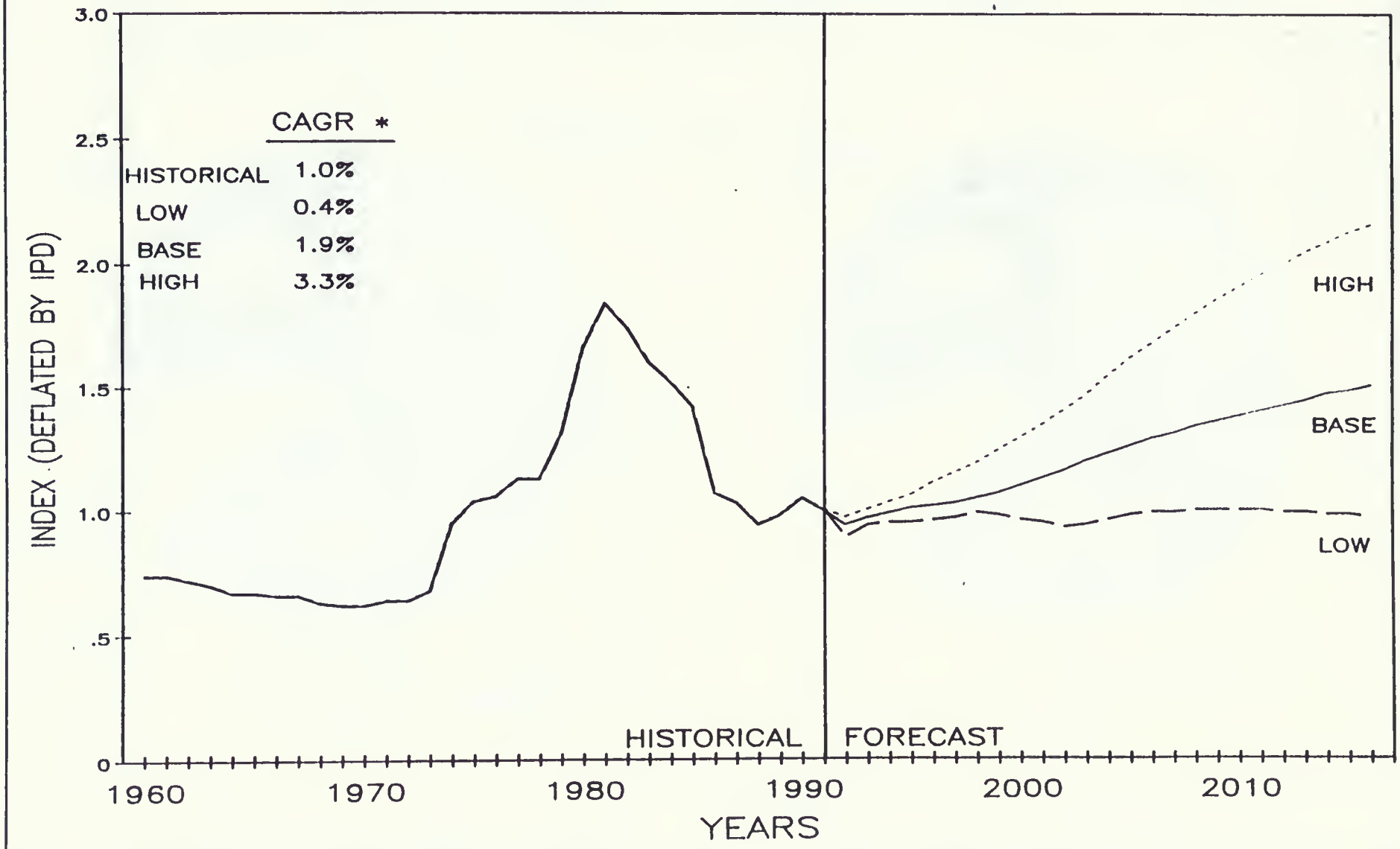


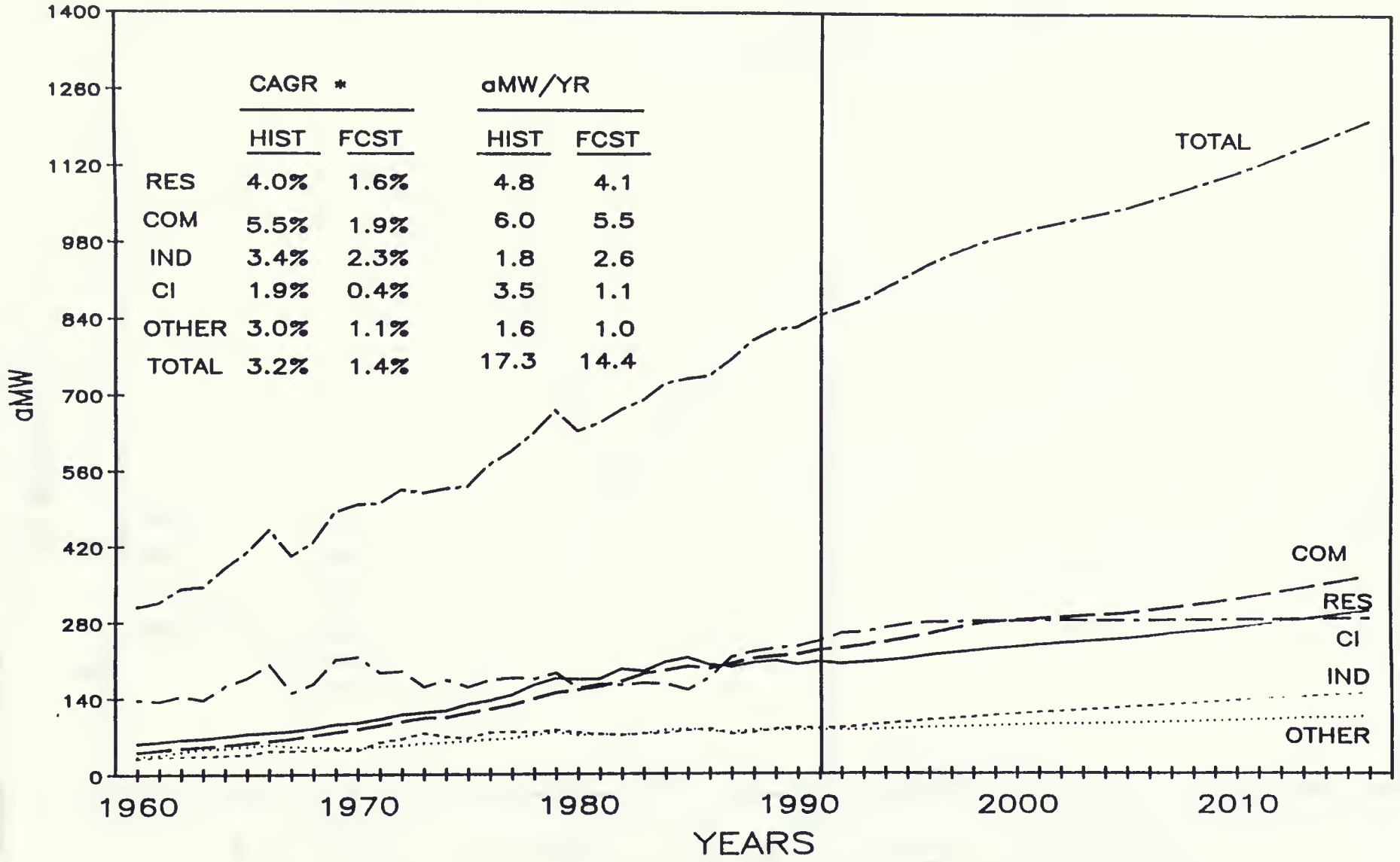
FIGURE 9
FUELS PRODUCER PRICE INDEX



* COMPOUND ANNUAL GROWTH RATE

R93 OUTPUTS-BOOK, BOOK.WK1, FPPI.CHT

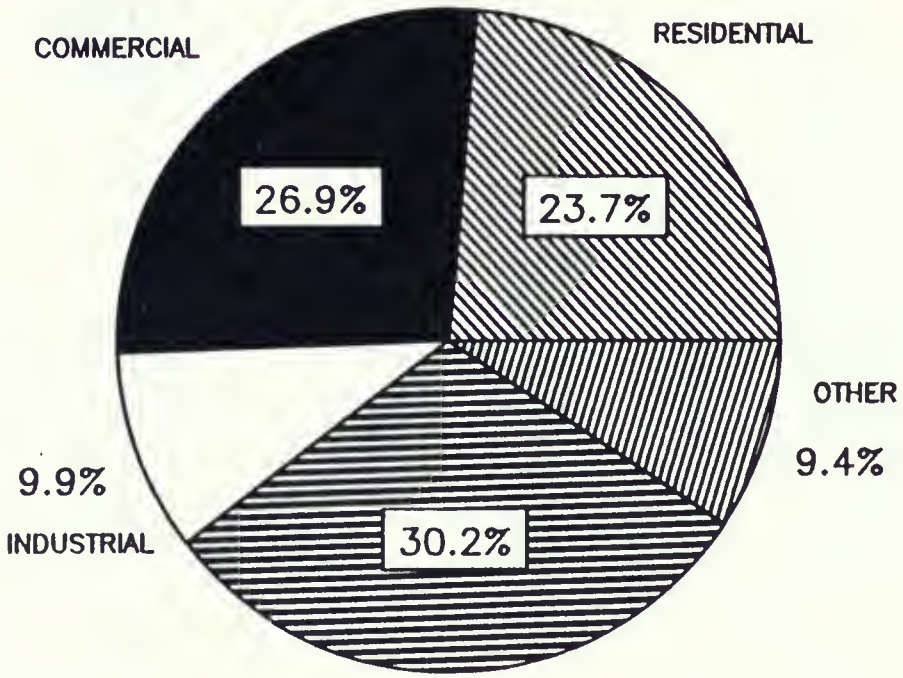
FIGURE 10
BUSINESS PLAN SALES BY CLASS



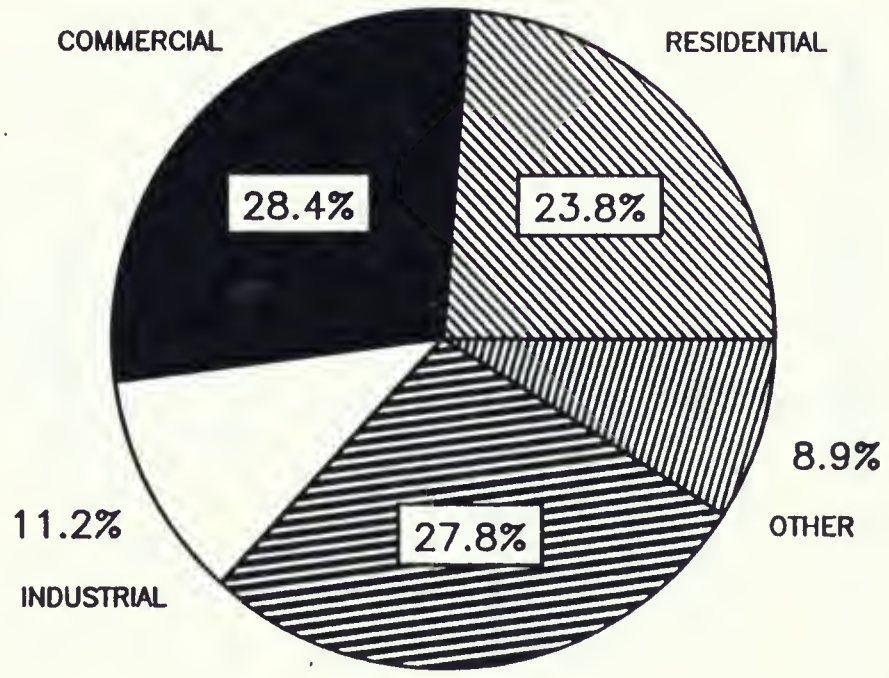
* COMPOUND ANNUAL GROWTH RATE

R93 OUTPUTS-BOOK, BOOK.WK1, CLSSLS.CHT

FIGURE 11
SALES BY CUSTOMER CLASS



1992

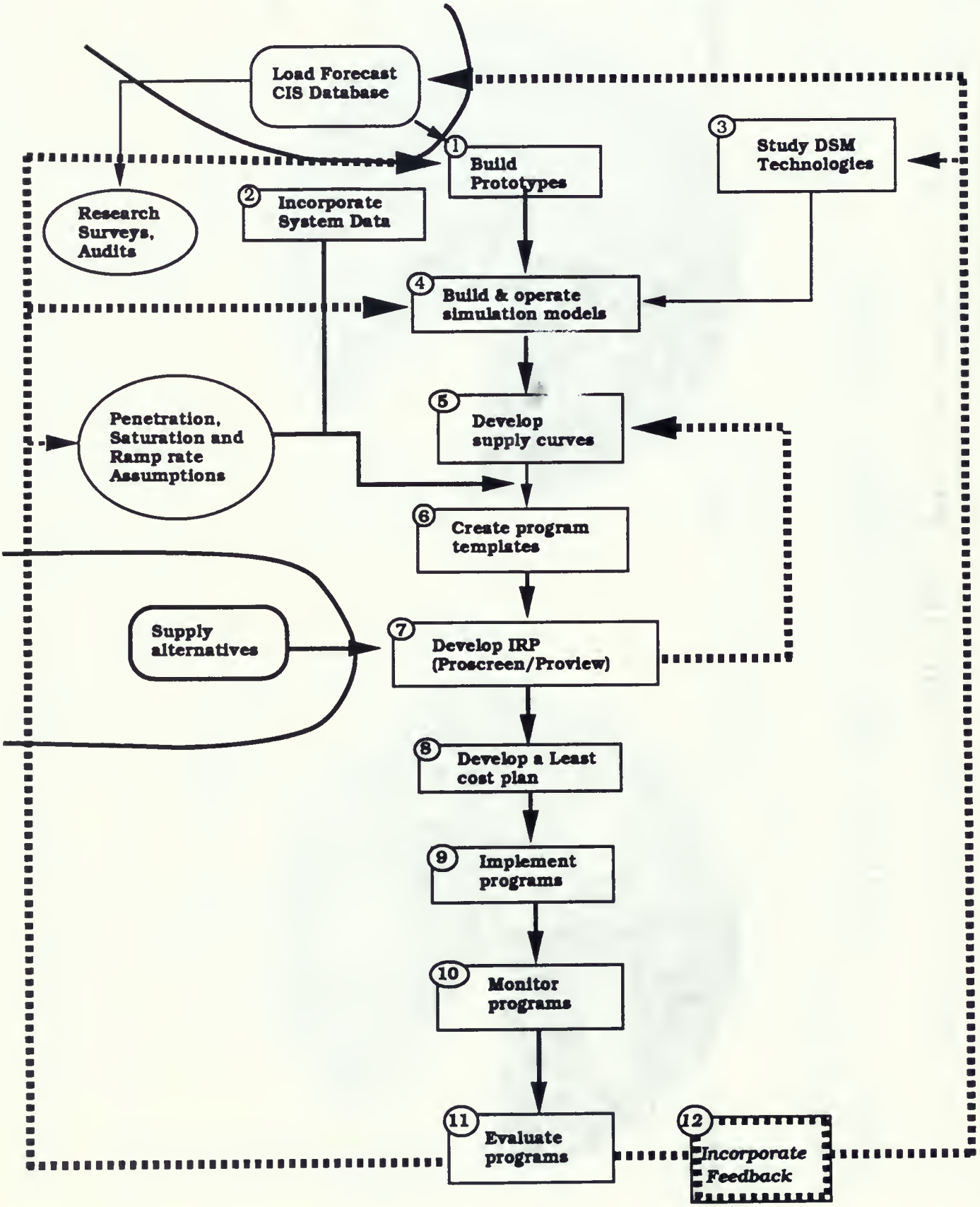


2002

* TOTALS MAY NOT SUM DUE TO ROUNDING

R93 OUTPUTS-BOOK, BOOK.WK1, SLSPIE.CHT

Figure 12. DSM Acquision Process



Attachment B - Tables

Table 1. Input Summary, 1960-1991 Historical

Table 2. Energy Load, Peak Load, and Sales by Large Class

Table 3. MPC Historical and 1993 Forecast Firm Energy and Peak Load, In Average MW and MW 1960-69, 1993 Least Cost Plan

Table 4. MPC 1992 Business Plan Energy and Peak Load Forecast and Resources Tabulations

Table 5. MPC 1992 Forecast Firm Energy and Peak Load in a Average MW and MW 1990-2015

Table 6. MPC Summary of 1993 Off-System Sales Forecast - Using 5% Gas Price Escalation

Table 7. RFP No. 91-1 Resource Summary Index - EEAF's as Proposed by Sponsors

Table 8. Sort by R3 Ratio

Table 9. Top Plans

Table 10. RFP No. 91-1 Resource Summary Index - Pricing as Reviewed by MPC, EEAF's as Calculated by MPC

Table 11. Run 5 DEE/EEAF Case Conservation

Table 12. Dynamic Analysis Step 2 Resource Plans

Table 13. Final Resource Plan Incremental Revenue Requirement K$

Table 14. Expected Water - Resource Timings

Table 15. No DEE - Resource Timings with SASA DSM

Table 16. DSM Risk and Uncertainty Analysis - Resource Plans with EEAF

Table 17. Load Profile

TABLE 1
INPUT SUMMARY, 1960 - 1991 HISTORICAL

						PRICE OF ELECTRICITY, 91 $					
YEAR	NFDI MIL OF 91 $	POP (000)'S	IPI	FUEL INDEX	ELEC SHS	500,000 kWh/MTH	2,400 kWh/MTH	5,000 kWh/MTH	500 kWh/MTH	IPD DDC	WPI
1960	3706	531.3	0.350	0.170		21006.60	278.48	469.83	46.67	0.231	0.272
1961	3765	545.0	0.352	0.172		20737.30	274.91	463.80	46.07	0.234	0.271
1962	3979	558.3	0.382	0.171		20388.80	270.29	456.01	45.29	0.238	0.272
1963	4037	556.8	0.405	0.170		20051.80	265.83	448.47	44.55	0.242	0.271
1964	4191	554.3	0.432	0.165		19723.90	259.72	439.39	42.76	0.246	0.272
1965	4402	563.0	0.475	0.168		19328.50	252.03	428.13	40.48	0.251	0.277
1966	4537	558.2	0.518	0.172		18731.50	244.25	414.90	39.23	0.259	0.286
1967	4638	555.7	0.528	0.176		18307.40	238.72	405.51	38.34	0.265	0.287
1968	4652	553.1	0.558	0.174		17577.80	229.20	389.35	36.81	0.276	0.294
1969	4664	549.1	0.584	0.178		19197.10	250.59	426.02	38.89	0.289	0.306
1970	5010	549.2	0.564	0.187		18831.90	245.86	418.05	37.91	0.302	0.317
1971	5271	562.8	0.572	0.203	1.7	17940.90	234.23	398.26	36.12	0.317	0.327
1972	5647	569.5	0.628	0.209		17491.10	230.79	392.43	35.59	0.329	0.342
1973	5957	576.4	0.679	0.237		17228.00	235.99	401.38	36.42	0.349	0.387
1974	6111	584.7	0.669	0.367	2.3	15576.60	213.37	362.90	32.93	0.386	0.459
1975	6422	594.8	0.610	0.432		14418.70	197.51	335.92	30.48	0.417	0.502
1976	6510	603.2	0.666	0.368		13634.00	186.76	317.64	28.82	0.441	0.525
1977	7198	613.3	0.719	0.532	6.3	14189.50	194.26	330.38	28.70	0.470	0.557
1978	7696	624.1	0.766	0.568		15054.30	194.19	333.63	27.90	0.504	0.601
1979	7751	628.6	0.796	0.719	7.1	14544.70	176.95	305.78	26.51	0.550	0.676
1980	7621	627.5	0.781	1.011		13222.20	160.85	277.98	24.22	0.609	0.772
1981	7762	634.1	0.798	1.224		14211.60	172.90	298.81	26.03	0.665	0.842
1982	7864	641.8	0.741	1.221	12.0	13988.40	170.20	294.13	25.63	0.703	0.859
1983	7885	648.7	0.785	1.171		15615.40	189.97	328.31	28.61	0.732	0.869
1984	8066	654.7	0.873	1.157		16842.00	137.53	247.05	25.89	0.760	0.890
1985	7471	656.0	0.890	1.116	13.8	22167.20	130.23	226.17	28.38	0.785	0.885
1986	7639	652.1	0.900	0.860		23121.10	135.77	235.80	29.70	0.804	0.860
1987	7810	648.4	0.933	0.865		23625.80	138.74	240.95	30.50	0.841	0.882
1988	7985	644.7	0.984	0.822	12.3	23331.40	139.21	235.86	31.35	0.874	0.917
1989	8164	640.8	1.009	0.897		23530.30	146.46	223.65	31.30	0.915	0.963
1990	8357	643.4	1.019	1.011		23107.50	143.71	219.95	30.46	0.962	0.998
1991	8636	646.4	1.000	1.000		23458.30	145.89	223.26	30.94	1.000	1.000
CAGR	2.73%	0.63%	3.39%	5.72%		0.36%	-2.09%	-2.40%	-1.33%	4.73%	4.20%

CAGR = COMPOUND ANNUAL GROWTH RATE

TABLE 1
INPUT SUMMARY, 1992 - 2016 FORECAST (Base Case)

						PRICE OF ELECTRICITY, 91 $					
YEAR	NFDI MIL OF 91 $	POP (000)'S	IPI	FUEL INDEX	ELEC SHS	500,000 kWh/MTH	2,400 kWh/MTH	5,000 kWh/MTH	500 kWh/MTH	IPD DDC	WPI
1992	8914	649.5	1.020	0.972	12.9	22592.24	140.50	215.02	29.80	1.032	1 007
1993	9193	652.5	1.066	1.034	12.9	21761.58	135.34	207.11	28.70	1.067	1.040
1994	9472	655.6	1.099	1.097	13.7	21330.91	132.66	203.01	28.13	1.104	1.072
1995	9751	658.6	1.133	1.148	14.3	21111.90	131.30	200.93	27.85	1.142	1.105
1996	9934	661.7	1.164	1.204	14 6	20975.93	130.45	199.63	27.67	1.184	1.143
1997	10116	664.7	1.195	1 273	14.8	21778.51	135.44	207.27	28.72	1.230	1.186
1998	10299	667.8	1.237	1.340	15.0	22589.45	140.49	214.99	29.79	1.280	1.228
1999	10482	670.8	1.273	1.419	15.1	22263.30	138.46	211.89	29.36	1.332	1.275
2000	10664	673.9	1.310	1.526	15.3	22267.72	138.49	211.93	29.37	1.389	1.329
2001	10843	675.9	1.350	1 643	15.6	22260.13	138.44	211.86	29.36	1.452	1.388
2002	11023	677.9	1.389	1 768	15.9	22257.08	138.42	211.83	29.36	1.519	1.451
2003	11202	679 8	1.431	1.899	16.2	22262.06	138.45	211.88	29.36	1.587	1.515
2004	11381	681.8	1 471	2.037	16.4	22259.75	138.44	211.85	29.36	1.657	1.583
2005	11561	683.8	1.506	2.180	16.7	22267.02	138.48	211.92	29.37	1.731	1.652
2006	11767	688.7	1.541	2.326	16.9	22265.72	138.47	211.91	29.37	1.809	1.725
2007	11974	693.5	1.577	2.480	17.0	22258.72	138.43	211.84	29.36	1.891	1.803
2008	12181	698.4	1.610	2.641	17.2	22259.79	138.44	211.85	29.36	1.976	1.886
2009	12387	703.2	1.642	2.810	17.4	22258.67	138.43	211.84	29 36	2.067	1.972
2010	12594	708.1	1 675	2.984	17.5	22259.51	138.43	211.85	29.36	2.162	2.063
2011	12894	715.6	1.706	3.175	17.6	22265.55	138.47	211.91	29.37	2.263	2.160
2012	13193	723.1	1.737	3.378	17.7	22262.02	138.45	211 87	29.36	2.372	2.264
2013	13493	730 5	1.768	3.594	17.9	22264.06	138.46	211.89	29.36	2.488	2.375
2014	13792	738 1	1.797	3 824	18.0	22263.31	138.46	211.89	29.36	2.610	2.491
2015	14092	745.5	1.826	4.069	18.1	22259.25	138.43	211.85	29.36	2.741	2.616
2016	14416	753.2	1.851	4.33	18.2	22257.64	138.42	211.38	29.36	2.881	2.746
CAGR	2.00%	0 62%	2.48%	6.22%	1.43%	-0.06%	-0.06%	-0.07%	-0.06%	4.28%	4.18%

CAGR = COMPOUND ANNUAL GROWTH RATE

ENERGY LOAD, PEAK LOAD AND SALES BY LARGE CLASS
1960-1991 ACTUAL, 1992-2016 BUSINESS PLAN FORECAST

HISTORICAL

	SALES IN MWH														LOAD IN aMW OR MW				
	RESIDENTIAL		COMMERCIAL		INDUSTRIAL		CONTRACT		OTHER		RAILROADS		TOTAL SALES		ENERGY		PEAK		LOAD FACTOR
YEAR	mwh	%gth	mwh	%gth	mwh	%gth	mwh	%gth	mwh	%gth	mwh	%gth	mwh	%gth	aMW	%gth	MW	%gth	
1960	520148		368535		256292		1203821		283091		85276		2717163		359		545		0 6594
1961	547422	5 2%	403542	9 5%	268753	4 9%	1169759	-2 8%	316943	12 0%	78899	-7 5%	2785318	2 5%	376	4 7%	585	7 3%	0 6431
1962	582157	6 3%	427741	6 0%	281419	4 7%	1265505	8 2%	356644	12 5%	86794	10 0%	3000300	7 7%	392	4 3%	576	-1 5%	0 6806
1963	597651	2 7%	451264	5 5%	292003	3 8%	1201127	-5 1%	410570	15 1%	83554	-3 7%	3036170	1 2%	399	1 8%	635	10 2%	0 6294
1964	632082	5 8%	481896	6 8%	310470	6 3%	1429250	19 0%	419860	2 3%	70785	-15 3%	3344344	10 2%	438	9 8%	650	2 4%	0 6742
1965	673483	6 5%	520797	8 1%	316174	1 8%	1556258	8 9%	450240	7 2%	81033	14 5%	3597985	7 6%	469	7 1%	683	5 1%	0 6874
1966	695996	3 3%	553713	6 3%	373871	18 2%	1771400	13 8%	478889	6 4%	87476	8 0%	3961344	10 1%	510	8 7%	737	7 9%	0 6924
1967	717091	3 0%	589852	6.5%	374839	0 3%	1317252	-25 6%	448000	-6 5%	81684	-6 6%	3528717	-10 9%	466	-8 6%	703	-4 6%	0 6633
1968	764937	6 7%	643022	9 0%	387509	3 4%	1465285	11 2%	431798	-3 6%	89039	9 0%	3761588	6 6%	495	6 2%	757	7 7%	0 6551
1969	820698	7 3%	690395	7 4%	402059	3 8%	1856521	26 7%	432297	0 1%	56734	-36 3%	4258704	13 2%	542	9 5%	748	-1 2%	0.7251
1970	850321	3 6%	740096	7 2%	418275	4 0%	1899701	2 3%	423403	-2 1%	72342	27 5%	4404137	3 4%	564	4 1%	782	4 5%	0.7219
1971	912861	7 4%	796792	7 7%	494221	18 2%	1639328	-13 7%	446985	5 6%	79943	10 5%	4370130	-0 8%	561	-0 5%	834	6 6%	0 6727
1972	984848	7 9%	856757	7 5%	565532	14 4%	1666499	1 7%	465900	4 2%	80593	0 8%	4620130	5 7%	589	5 0%	867	4 0%	0 6795
1973	1016702	3 2%	916428	7 0%	604061	6 8%	1414329	-15 1%	499786	7 3%	51569	-36 0%	4502875	-2 5%	578	-1 9%	843	-2 8%	0 6856
1974	1043593	2 6%	930212	1 5%	606698	0 4%	1525603	7 9%	505315	1 1%	22577	-56 2%	4633999	2 9%	599	3 6%	823	-2 4%	0 7286
1975	1143941	9 6%	996749	7 2%	587023	-3 2%	1406861	-7 8%	532902	5 5%			4667477	0 7%	606	1 2%	880	6 9%	0 6889
1976	1205322	5 4%	1060597	6 4%	674948	15 0%	1523939	8 3%	556341	4 4%			5021152	7 6%	650	7 3%	930	5 7%	0 6998
1977	1299608	7 8%	1129770	6 5%	668734	-0 9%	1555070	2 0%	575076	3 4%			5228258	4 1%	687	5 7%	1026	10 3%	0 6698
1978	1454858	11 9%	1227173	8 6%	673483	0 7%	1538519	-1 1%	631492	9 8%			5525525	5 7%	719	4 7%	1095	6 7%	0 6572
1979	1560303	7 2%	1323282	7 8%	706090	4 8%	1635349	6.3%	672082	6 4%			5897105	6 7%	772	7 4%	1154	5 4%	0 6690
1980	1538693	-1 4%	1363747	3 1%	662738	-6 1%	1381666	-15 5%	634226	-5 6%			5581070	-5 4%	745	3 5%	1171	1 5%	0 6363
1981	1547579	0 6%	1418839	4 0%	635931	-4 0%	1453401	5 2%	625399	-1 4%			5681149	1 8%	746	0 1%	1124	-4 0%	0 6645
1982	1706174	10 2%	1507494	6 2%	624485	-1 8%	1439265	-1 0%	632554	1 1%			5909972	4 0%	766	2 7%	1135	1 0%	0 6756
1983	1674886	-1 8%	1628567	8 0%	647388	3 7%	1466830	2 1%	649351	2 7%			6063344	2 6%	786	2 6%	1283	13 0%	0 8130
1984	1824344	8 9%	1682008	3 3%	656510	1 4%	1455762	-0 9%	707934	9 0%			6326559	4 3%	816	3 8%	1221	-4 8%	0 6688
1985	1888050	3 5%	1741703	3 5%	704011	7 2%	1353468	-7 0%	728036	2 8%			6415268	1 4%	839	2 8%	1295	6 1%	0 6480
1986	1766168	-6 5%	1709024	-1 9%	725869	3 1%	1559760	15 2%	696123	-4 4%			6456944	0 6%	838	-0 1%	1233	-4 8%	0 6804
1987	1733514	-1 8%	1783160	4 3%	643104	-11 4%	1895900	21 6%	664628	-4 5%			6720306	4 1%	863	3 0%	1237	0 3%	0 6981
1988	1800410	3 9%	1877405	5 3%	664783	3 4%	1981327	4 5%	707667	6 5%			7031591	4 6%	902	4 5%	1287	4 0%	0 7009
1989	1836345	2 0%	1913526	1 9%	713970	7 4%	2035180	2 7%	712143	0 6%			7211165	2 6%	929	3 0%	1420	10 3%	0 6542
1990	1778360	-3 2%	1932846	1 0%	755797	5 9%	2069380	1 7%	705761	-0 9%			7242145	0 4%	938	1 0%	1504	5 9%	0 6237
1991	1819780	2 3%	2003492	3.7%	732921	-3 0%	2155252	4 1%	715863	1.4%			7427308	2 6%	950	1 3%	1362	-9 4%	0 6975

Table 2

ENERGY LOAD, PEAK LOAD AND SALES BY LARGE CLASS
1992-2016 BASE CASE FORECAST

	SALES IN MWH														LOAD IN aMW OR MW				
	RESIDENTIAL		COMMERCIAL		INDUSTRIAL		CONTRACT		OTHER		RAILROADS		TOTAL SALES		ENERGY		PEAK *		LOAD FACTOR
YEAR	mwh	%gth	mwh	%gth	mwh	%gth	mwh	%gth	mwh	%gth	mwh	%gth	mwh	%gth	aMW	%gth	MW	%gth	
1992	1786444	-1 8%	2034498	1 5%	748640	2 1%	2275289	5 6%	706013	-1 4%			7550884	1 7%	966	1 7%	1412	3 7%	0 6841
1993	1809317	1 3%	2082021	2 3%	772500	3 2%	2293340	0 8%	712691	0 9%			7669870	1 6%	982	1 7%	1439	1 9%	0 6824
1994	1838103	1 6%	2135701	2 6%	805289	4 2%	2366540	3 2%	721171	1 2%			7866804	2 6%	1007	2 5%	1475	2 5%	0 6827
1995	1878058	2 2%	2199114	3 0%	831254	3 2%	2422396	2 4%	731842	1 5%			8062664	2 5%	1033	2 6%	1511	2 4%	0 6837
1996	1925538	2 5%	2271564	3 3%	863934	3 9%	2450136	1 1%	744430	1 7%			8255603	2 4%	1058	2 4%	1546	2 3%	0 6843
1997	1964614	2 0%	2348129	3 4%	884687	2 4%	2460236	0 4%	755507	1 5%			8413154	1 9%	1078	1 9%	1573	1 7%	0 6853
1998	1996270	1 6%	2413437	2 8%	908831	2 7%	2466136	0 2%	764915	1 2%			8549589	1 6%	1096	1 7%	1599	1 7%	0 6854
1999	2029665	1 7%	2457947	1 8%	933626	2 7%	2470536	0 2%	773463	1 1%			8665238	1 4%	1111	1 4%	1621	1 4%	0 6854
2000	2062174	1 6%	2491388	1 4%	955064	2 3%	2474036	0 1%	781434	1 0%			8764096	1 1%	1123	1 1%	1640	1 2%	0 6848
2001	2091009	1 4%	2513934	0 9%	977527	2 4%	2480086	0 2%	787838	0 8%			8850395	1 0%	1134	1 0%	1656	1 0%	0 6848
2002	2119424	1 4%	2533780	0 8%	999735	2 3%	2479596	-0 0%	794205	0 8%			8926741	0 9%	1144	0 9%	1671	0 9%	0 6846
2003	2147441	1 3%	2554029	0 8%	1022914	2 3%	2479996	0 0%	800531	0 8%			9004911	0 9%	1154	0 9%	1685	0 8%	0 6849
2004	2175071	1 3%	2576564	0 9%	1045870	2 2%	2480396	0 0%	807100	0 8%			9085001	0 9%	1164	0 9%	1700	0 9%	0 6847
2005	2202269	1 3%	2602436	1 0%	1066813	2 0%	2481796	0 1%	813426	0 8%			9166741	0 9%	1175	0 9%	1716	0 9%	0 6847
2006	2238137	1 6%	2642870	1 6%	1088353	2 0%	2482196	0 0%	822175	1 1%			9273732	1 2%	1189	1 2%	1740	1 4%	0 6833
2007	2273582	1 6%	2686266	1 6%	1110611	2 0%	2484596	0 1%	831020	1 1%			9386075	1 2%	1203	1 2%	1763	1 3%	0 6824
2008	2308567	1 5%	2731835	1 7%	1132228	1 9%	2487996	0 1%	840090	1 1%			9500717	1 2%	1219	1 3%	1788	1 4%	0 6818
2009	2343142	1 5%	2778673	1 7%	1153313	1 9%	2490396	0 1%	848607	1 0%			9614331	1 2%	1234	1 2%	1812	1 3%	0 681
2010	2377332	1 5%	2826050	1 7%	1175224	1 9%	2493796	0 1%	857671	1 0%			9730073	1 2%	1249	1 2%	1837	1 4%	0 6799
2011	2420722	1 8%	2884010	2 1%	1196169	1 8%	2496196	0 1%	868647	1 3%			9865744	1 4%	1266	1 4%	1868	1 7%	0 6777
2012	2464587	1 8%	2942751	2 0%	1217301	1 8%	2499596	0 1%	879926	1 3%			10004161	1 4%	1284	1 4%	1901	1 8%	0 6754
2013	2508461	1 8%	3002321	2 0%	1238534	1 7%	2502996	0 1%	890897	1 2%			10143210	1 4%	1301	1 3%	1932	1 6%	0 6734
2014	2553268	1 8%	3064080	2 1%	1258960	1 6%	2506396	0 1%	902325	1 3%			10285030	1 4%	1321	1 5%	1967	1 8%	0 6716
2015	2597631	1 7%	3126219	2 0%	1279635	1 6%	2510796	0 2%	913702	1 3%			10427984	1 4%	1339	1 4%	2000	1 7%	0 6695
2016	2643517	1 8%	3190734	2 1%	1298559	1 5%	2514196	0 1%	925655	1 3%			10572662	1 4%	1357	1 3%	2033	1 7%	0 6675
1960 91	4 0%		5 5%		3 4%		1 9%		3 0%				3 2%		3 1%		3 0%		
CAGR ** 1992-2016	1 6%		1 9%		2 3%		0.4%		1.1%				1 4%		1 4%		1 5%		

* Assumes normal weather conditions
** Compound Annual Growth Rate
R93 Outputs, Page 2 of 4

Table 2

ENERGY LOAD, PEAK LOAD AND SALES BY LARGE CLASS
1992-2016 HIGH CASE FORECAST

	SALES IN MWH														LOAD IN aMW OR MW				
	RESIDENTIAL		COMMERCIAL		INDUSTRIAL		CONTRACT		OTHER		RAILROADS		TOTAL SALES		ENERGY		PEAK *		LOAD FACTOR
YEAR	mwh	%gth	mwh	%gth	mwh	%gth	mwh	%gth	mwh	%gth	mwh	%gth	mwh	%gth	aMW	%gth	MW	%gth	
1992	1786444		2034498		748640		2275289		706013				7550884		966		1412		0 6841
1993	1809317	1 3%	2082021	2 3%	772500	3 2%	2319376	1 9%	714893	1 3%			7698108	1 9%	985	2 0%	1443	2 2%	0 6826
1994	1849944	2 2%	2145608	3 1%	835037	8 1%	2529436	9 1%	727255	1 7%			8087280	5 1%	1036	5 2%	1511	4 7%	0 6856
1995	1904939	3 0%	2227688	3 8%	861124	3 1%	2585786	2 2%	742856	2 1%			8322393	2 9%	1066	2 9%	1552	2 7%	0 6869
1996	1970296	3 4%	2325970	4 4%	889109	3 2%	2624196	1 5%	761276	2 5%			8570847	3 0%	1099	3 1%	1594	2 7%	0 6895
1997	2027326	2 9%	2433550	4 6%	912408	2 6%	2645670	0 8%	778518	2 3%			8797473	2 6%	1128	2 6%	1633	2 4%	0 6908
1998	2076819	2 4%	2532432	4 1%	937036	2 7%	2664940	0 7%	794249	2 0%			9005477	2 4%	1155	2 4%	1669	2 2%	0 692
1999	2128184	2 5%	2610288	3 1%	970059	3 5%	2683600	0 7%	809168	1 9%			9201300	2 2%	1180	2 2%	1703	2 0%	0 6929
2000	2178679	2 4%	2675465	2 5%	1000511	3 1%	2702700	0 7%	822439	1 6%			9379794	1 9%	1202	1 9%	1734	1 8%	0 6932
2001	2235233	2 6%	2739187	2 4%	1031403	3 1%	2721280	0 7%	836286	1 7%			9563390	2 0%	1227	2 1%	1766	1 8%	0 6948
2002	2291551	2 5%	2797761	2 1%	1062745	3 0%	2740340	0 7%	850000	1 6%			9742398	1 9%	1250	1 9%	1796	1 7%	0 696
2003	2347814	2 4%	2854490	2 0%	1091317	2 7%	2759710	0 7%	863579	1 6%			9916711	1 8%	1273	1 8%	1826	1 7%	0 6972
2004	2403404	2 4%	2911726	2 0%	1118639	2 5%	2779420	0 7%	877331	1 6%			10090520	1 8%	1294	1 6%	1854	1 5%	0 698
2005	2458848	2 3%	2971089	2 0%	1145377	2 4%	2798790	0 7%	890795	1 5%			10264900	1 7%	1318	1 9%	1884	1 6%	0 6996
2006	2519376	2 5%	3040212	2 3%	1171860	2 3%	2819570	0 7%	905832	1 7%			10456850	1 9%	1342	1 8%	1921	2 0%	0 6986
2007	2579473	2 4%	3111978	2 4%	1200518	2 4%	2839260	0 7%	920953	1 7%			10652180	1 9%	1368	1 9%	1958	1 9%	0 6987
2008	2639079	2 3%	3185913	2 4%	1229098	2 4%	2859130	0 7%	936302	1 7%			10849523	1 9%	1393	1 8%	1996	1 9%	0 6979
2009	2698233	2 2%	3261296	2 4%	1257861	2 3%	2879110	0 7%	951311	1 6%			11047812	1 8%	1418	1 8%	2032	1 8%	0 6978
2010	2756962	2 2%	3337496	2 3%	1286705	2 3%	2900480	0 7%	966485	1 6%			11248128	1 8%	1444	1 8%	2071	1 9%	0 6972
2011	2827016	2 5%	3426992	2 7%	1315201	2 2%	2920850	0 7%	984280	1 8%			11474339	2 0%	1474	2 1%	2118	2 3%	0 6959
2012	2897864	2 5%	3518199	2 7%	1343519	2 2%	2941170	0 7%	1002493	1 9%			11703245	2 0%	1504	2 0%	2164	2 2%	0 695
2013	2969294	2 5%	3611878	2 7%	1371944	2 1%	2962595	0 7%	1020592	1 8%			11936304	2 0%	1534	2 0%	2211	2 2%	0 6938
2014	3041219	2 4%	3708164	2 7%	1399696	2 0%	2983418	0 7%	1039108	1 8%			12171605	2 0%	1564	2 0%	2260	2 2%	0 692
2015	3113871	2 4%	3807286	2 7%	1427232	2 0%	3004140	0 7%	1057912	1 8%			12410442	2 0%	1595	2 0%	2309	2 2%	0 6908
2016	3187658	2 4%	3908842	2 7%	1454239	1 9%	3026485	0 7%	1077240	1 8%			12654465	2 0%	1627	2 0%	2358	2 1%	0 69
CAGR **																			
1992-2016	2 4%		2 7%		2 8%		1 2%		1 8%				2 2%		2 2%		2 1%		

* Assumes normal weather conditions
** Compound Annual Growth Rate
R93 Outputs, Page 3 of 4

Table 2

ENERGY LOAD, PEAK LOAD AND SALES BY LARGE CLASS
1992-2016 LOW CASE FORECAST

	SALES IN MWH														LOAD IN aMW OR MW				
	RESIDENTIAL		COMMERCIAL		INDUSTRIAL		CONTRACT		OTHER		RAILROADS		TOTAL SALES		ENERGY		PEAK *		LOAD FACTOR
YEAR	mwh	%gth	mwh	%gth	mwh	%gth	mwh	%gth	mwh	%gth	mwh	%gth	mwh	%gth	aMW	%gth	MW	%gth	
1992	1786444		2034498		748640		2275289		706013				7550884		966		1412		0 6841
1993	1809317	1 3%	2082021	2 3%	772500	3 2%	2110627	-7 2%	712426	0 9%			7486892	-0 8%	958	-0 8%	1410	-0 1%	0 6794
1994	1828730	1 1%	2132337	2 4%	796075	3 1%	1955169	-7 4%	718901	0 9%			7431213	-0 7%	950	-0 8%	1408	-0 1%	0 6747
1995	1861471	1 8%	2189530	2 7%	828132	4 0%	1900229	-2 8%	727765	1 2%			7507127	1 0%	960	1 1%	1425	1 2%	0 6737
1996	1900191	2 1%	2249618	2 7%	845955	2 2%	1900229	0 0%	737949	1 4%			7633942	1 7%	976	1 7%	1447	1 5%	0 6745
1997	1930285	1 6%	2311966	2 8%	856189	1 2%	1900229	0 0%	746479	1 2%			7745149	1 5%	991	1 5%	1470	1 6%	0 6741
1998	1952857	1 2%	2362069	2 2%	868659	1 5%	1900229	0 0%	753287	0 9%			7637081	1 2%	1003	1 2%	1488	1 2%	0 6741
1999	1976948	1 2%	2391382	1 2%	888998	2 3%	1900229	0 0%	759158	0 8%			7916716	1 0%	1013	1 0%	1503	1 0%	0 674
2000	2000003	1 2%	2410068	0 8%	908765	2 2%	1743102	-8 3%	764469	0 7%			7826408	-1 1%	1002	-1 1%	1493	-0 7%	0 6711
2001	2019172	1 0%	2418588	0 4%	928130	2 1%	1743102	0 0%	768217	0 5%			7877210	0 6%	1009	0 7%	1504	0 7%	0 6709
2002	2037735	0 9%	2425022	0 3%	946643	2 0%	1743102	0.0%	771930	0 5%			7924432	0 6%	1015	0 6%	1513	0 6%	0 6709
2003	2055741	0 9%	2432282	0 3%	962403	1 7%	1497822	-14.1%	775595	0 5%			7723844	-2 5%	989	-2 6%	1484	-1 9%	0 6664
2004	2073228	0 9%	2442082	0 4%	977243	1.5%	1497822	0 0%	779494	0 5%			7769870	0 6%	995	0 6%	1493	0 6%	0 6664
2005	2090181	0 8%	2455289	0 5%	989446	1 2%	1497822	0 0%	783136	0 5%			7815874	0 6%	1001	0 6%	1504	0 7%	0 6656
2006	2114354	1 2%	2481368	1.1%	1001175	1 2%	1497822	0 0%	788863	0 7%			7883583	0 9%	1010	0 9%	1520	1 1%	0 6645
2007	2137979	1 1%	2510210	1.2%	1014035	1 3%	1497822	0 0%	794655	0 7%			7954701	0 9%	1019	0 9%	1537	1 1%	0 663
2008	2161049	1 1%	2540977	1 2%	1027297	1 3%	1497822	0 0%	800638	0 8%			8027784	0 9%	1028	0 9%	1554	1 1%	0 6615
2009	2183625	1 0%	2572767	1.3%	1039965	1 2%	1497822	0 0%	806240	0 7%			8100419	0 9%	1038	1 0%	1572	1 2%	0 6603
2010	2205753	1 0%	2604883	1 2%	1053264	1 3%	1497822	0 0%	811964	0 7%			8173686	0 9%	1047	0 9%	1590	1 1%	0 6585
2011	2235234	1 3%	2645385	1 6%	1087422	1 3%	1497822	0 0%	819371	0 9%			8265235	1 1%	1058	1 1%	1613	1 4%	0 6559
2012	2265011	1 3%	2686326	1 5%	1081198	1.3%	1497822	0 0%	827031	0 9%			8357386	1.1%	1071	1 2%	1638	1 5%	0 6538
2013	2295277	1 3%	2728517	1 6%	1094350	1 2%	1497822	0 0%	834482	0 9%			8450449	1 1%	1082	1 0%	1661	1 4%	0 6514
2014	2325353	1 3%	2771192	1 6%	1107539	1 2%	1497822	0 0%	842109	0 9%			8544016	1 1%	1095	1 2%	1686	1 5%	0 6495
2015	2355545	1 3%	2814743	1 6%	1120938	1 2%	1497822	0 0%	849804	0 9%			8638852	1 1%	1107	1 1%	1710	1 4%	0 6474
2016	2386285	1 3%	2859525	1.6%	1133777	1.1%	1497822	0.0%	857846	0 9%			8735255	1 1%	1119	1 1%	1736	1.5%	0 6448
CAGR **																			
1992-2016	1 2%		1 4%		1.7%		-1.7%		0 8%				0 6%		0 6%		0 9%		

* Assumes normal weather conditions
** Compound Annual Growth Rate
R93 Outputs, Page 4 of 4

TABLE 3
The Montana Power Company 1993
Historical Firm Energy and Peak Load, in average MW and MW
1960-69, 1993 LEAST COST PLAN

CALENDAR YEAR

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	OPERATING YEAR	
1960 ENERGY:	298	328	377	380	369	372	369	356	349	358	374	385	359		
PEAK:	454	483	500	471	476	466	485	462	451	480	533	545	545		
L.F.:	0.656	0.675	0.754	0.807	0.775	0.798	0.761	0.771	0.774	0.746	0.702	0.706	0.659		
1961 ENERGY:	378	373	375	374	361	372	361	375	351	377	399	419	376	1960-1961	369
PEAK:	513	493	490	473	466	493	474	484	471	512	559	585	585		545
L.F.:	0.737	0.757	0.765	0.791	0.775	0.755	0.762	0.775	0.745	0.736	0.714	0.716	0.643		
1962 ENERGY:	431	418	411	393	393	393	367	354	347	384	396	417	392	1961-1962	393
PEAK:	576	540	524	493	502	497	494	453	464	520	552	559	576		585
L.F.:	0.748	0.774	0.784	0.797	0.783	0.791	0.743	0.781	0.748	0.738	0.717	0.746	0.681		
1963 ENERGY:	457	418	408	395	376	364	372	376	369	392	416	454	399	1962-1963	390
PEAK:	601	554	514	518	489	489	499	493	478	524	601	635	635		601
L.F.:	0.76	0.755	0.794	0.763	0.769	0.744	0.745	0.763	0.772	0.748	0.692	0.715	0.628		
1964 ENERGY:	417	444	462	428	425	433	434	429	422	425	448	476	438	1963-1964	416
PEAK:	602	588	575	559	549	547	540	554	543	567	615	650	650		635
L.F.:	0.693	0.755	0.803	0.766	0.774	0.792	0.804	0.774	0.777	0.75	0.728	0.732	0.674		
1965 ENERGY:	468	469	470	459	444	451	452	453	467	470	488	512	469	1964-1965	450
PEAK:	627	632	601	578	567	569	574	591	612	600	654	683	683		650
L.F.:	0.746	0.742	0.782	0.794	0.783	0.793	0.787	0.766	0.763	0.783	0.746	0.75	0.687		
1966 ENERGY:	524	519	502	492	488	489	495	494	487	511	539	554	510	1965-1966	488
PEAK:	689	675	654	621	617	609	622	625	614	660	737	728	737		689
L.F.:	0.761	0.769	0.768	0.792	0.791	0.803	0.796	0.79	0.793	0.774	0.731	0.761	0.692		
1967 ENERGY:	555	558	557	526	507	511	438	390	376	370	389	424	466	1966-1967	525
PEAK:	703	697	699	663	651	626	655	508	491	492	566	621	703		737
L.F.:	0.789	0.801	0.797	0.793	0.779	0.816	0.669	0.768	0.766	0.752	0 687	0.683	0.663		
1968 ENERGY:	438	410	391	470	520	520	532	517	509	520	543	579	495	1967-1968	428
PEAK:	589	552	529	595	644	649	663	640	626	650	704	757	757		655
L.F.:	0.744	0.743	0.739	0.79	0.807	0.801	0.802	0.808	0.813	0.8	0.771	0.765	0.654		
1969 ENERGY:	602	583	560	527	520	518	520	521	520	529	543	567	542	1968-1969	543
PEAK:	748	698	712	655	647	642	656	643	640	683	699	731	748		757
L.F.:	0.805	0.835	0.787	0.805	0.804	0.807	0.793	0.81	0.813	0.775	0.777	0.776	0.725		

R93 OUTPUTS, LOADS

TABLE 3
The Montana Power Company 1993
Historical Firm Energy and Peak Load, in average MW and MW
1970-79, 1993 LEAST COST PLAN

CALENDAR YEAR

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	OPERATING YEAR	
1970 ENERGY:	592	572	569	552	525	546	546	556	545	561	590	614	564	1969-1970	546
PEAK:	753	710	697	672	668	698	679	694	657	708	767	782	782		753
L.F.:	0.786	0.806	0.818	0.821	0.788	0.782	0.804	0.801	0.83	0.792	0.769	0.785	0.721		
1971 ENERGY:	620	603	595	569	562	577	452	469	446	555	614	664	561	1970-1971	578
PEAK:	810	739	723	684	681	720	588	590	635	755	776	834	834		810
L.F.:	0.765	0.816	0.823	0.832	0.825	0.801	0.769	0.795	0.702	0.735	0.791	0.796	0.673		
1972 ENERGY:	675	649	611	577	574	573	560	544	530	551	583	636	589	1971-1972	572
PEAK:	867	811	751	697	701	699	698	682	659	716	767	843	867		867
L.F.:	0.779	0.8	0.814	0.828	0.819	0.82	0.802	0.798	0.804	0.77	0.76	0.754	0.679		
1973 ENERGY:	631	605	568	556	546	562	577	571	544	558	606	605	578	1972-1973	573
PEAK:	843	779	714	687	712	706	723	720	666	739	696	772	843		843
L.F.:	0.749	0.777	0.796	0.809	0.767	0.796	0.798	0.793	0.817	0.755	0.871	0.784	0.686		
1974 ENERGY:	643	608	598	577	585	597	615	575	568	574	612	639	599	1973-1974	589
PEAK:	823	740	739	695	728	760	770	745	685	725	774	794	823		823
L.F.:	0.781	0.822	0.809	0.83	0.804	0.786	0.799	0.772	0.829	0.792	0.791	0.805	0.728		
1975 ENERGY:	649	659	611	585	567	571	597	577	560	599	630	665	606	1974-1975	602
PEAK:	808	849	752	742	706	713	792	755	686	738	840	880	880		849
L.F.:	0.803	0.776	0.813	0.788	0.803	0.801	0.754	0.764	0.816	0.812	0.75	0.756	0.689		
1976 ENERGY:	675	655	646	601	593	629	655	624	625	651	700	749	650	1975-1976	619
PEAK:	885	895	829	777	735	787	829	797	765	793	900	930	930		895
L.F.:	0.763	0.732	0.779	0.773	0.807	0.799	0.79	0.783	0.817	0.821	0.778	0.805	0.699		
1977 ENERGY:	782	703	691	660	648	676	589	653	649	648	742	799	687	1976-1977	680
PEAK:	960	856	847	816	794	849	755	788	768	851	985	1026	1026		960
L.F.:	0.815	0.821	0.816	0.809	0.816	0.796	0.78	0.829	0.845	0.761	0.753	0.779	0.67		
1978 ENERGY:	798	761	697	654	616	634	658	714	682	717	824	876	719	1977-1978	687
PEAK:	991	966	959	795	759	837	887	883	834	910	1034	1095	1095		1026
L.F.:	0.805	0.788	0.727	0.823	0.812	0.757	0.742	0.809	0.818	0.788	0.797	0.8	0.657		
1979 ENERGY:	934	850	783	688	689	710	742	727	725	750	824	837	772	1978-1979	760
PEAK:	1154	1064	952	842	870	882	951	948	845	913	1036	1056	1154		1154
L.F.:	0.809	0.799	0.822	0.817	0.792	0.805	0.78	0.767	0.858	0.821	0.795	0.793	0.669		

TABLE 3
The Montana Power Company 1993
Historical Firm Energy and Peak Load, in average MW and MW
1980-89, 1993 LEAST COST PLAN

CALENDAR YEAR

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann	OPERATING YEAR	
1980 ENERGY:	923	859	840	729	681	681	669	663	655	682	736	818	745	1979-1980	777
PEAK:	1171	1109	1089	925	871	878	876	860	777	868	932	1081	1171		1171
L.F.:	0.788	0.775	0.771	0.788	0.782	0.776	0.764	0.771	0.843	0.786	0.79	0.757	0.636		
1981 ENERGY:	776	806	771	715	674	682	746	741	716	738	772	822	746	1980-1981	721
PEAK:	960	1124	916	897	875	895	950	920	884	943	987	1051	1124		1124
L.F.:	0.808	0.717	0.842	0.797	0.77	0.762	0.785	0.805	0.81	0.783	0.782	0.782	0.664		
1982 ENERGY:	887	831	774	720	673	678	689	720	703	768	860	892	766	1981-1982	758
PEAK:	1135	1114	950	922	859	871	922	933	870	950	1077	1129	1135		1135
L.F.:	0.781	0.746	0.815	0.781	0.783	0.778	0.747	0.772	0.808	0.808	0.799	0.79	0.675		
1983 ENERGY:	839	803	801	750	747	776	728	761	721	740	792	974	786	1982-1983	779
PEAK:	1038	1038	954	925	898	978	939	978	901	884	1093	1283	1283		1129
L.F.:	0.808	0.774	0.84	0.811	0.832	0.793	0.775	0.778	0.8	0.837	0.725	0.759	0.613		
1984 ENERGY:	871	811	795	762	737	770	812	805	767	824	873	966	816	1983-1984	789
PEAK:	1221	1001	975	972	914	1028	1019	1013	1020	1083	1116	1221	1221		1283
L.F.:	0.713	0.81	0.815	0.784	0.806	0.749	0.797	0.795	0.752	0.761	0.782	0.791	0.668		
1985 ENERGY:	950	930	842	735	754	757	852	772	779	804	952	939	839	1984-1985	835
PEAK:	1249	1295	1136	909	962	1008	1123	1004	986	1101	1272	1289	1295		1295
L.F.:	0.761	0.718	0.741	0.809	0.784	0.751	0.759	0.769	0.79	0.73	0.748	0.728	0.648		
1986 ENERGY:	902	919	786	739	758	793	831	842	806	819	921	947	838	1985-1986	833
PEAK:	1134	1170	971	951	990	1061	1033	1078	972	1019	1233	1187	1233		1289
L.F.:	0.795	0.785	0.809	0.777	0.764	0.747	0.804	0.781	0.829	0.804	0.747	0.798	0.68		
1987 ENERGY:	932	880	867	793	821	842	847	839	819	841	900	976	863	1986-1987	858
PEAK:	1236	1189	1068	976	1043	1059	1060	1052	1006	1058	1140	1237	1237		1236
L.F.:	0.754	0.74	0.812	0.813	0.787	0.795	0.799	0.798	0.814	0.795	0.789	0.789	0.698		
1988 ENERGY:	1012	969	905	821	850	919	917	877	848	818	918	965	902	1987-1988	892
PEAK:	1287	1247	1069	1018	1063	1178	1163	1115	1042	1070	1155	1211	1287		1287
L.F.:	0.786	0.777	0.847	0.806	0.8	0.78	0.788	0.787	0.814	0.764	0.795	0.797	0.701		
1989 ENERGY:	979	1083	971	868	847	893	953	902	846	884	940	1038	934	1988-1989	915
PEAK:	1303	1420	1303	1067	1006	1114	1177	1131	1004	1097	1177	1370	1420		1420
L.F.:	0.751	0.763	0.745	0.813	0.842	0.802	0.81	0.798	0.843	0.806	0.799	0.758	0.658		

TABLE 3
The Montana Power Company 1993
Historical and Forecast Firm Energy and Peak Load, in average MW and MW
1990-99, 1993 LEAST COST PLAN

CALENDAR YEAR

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann	OPERATING YEAR	
1990 ENERGY:	1004	984	904	872	857	922	964	914	876	913	946	1098	938	1989-1990	926
PEAK:	1300	1322	1189	1106	1064	1188	1190	1164	1144	1101	1196	1504	1504		1370
L.F.:	0.772	0.744	0.76	0.788	0.805	0.778	0.81	0.785	0.766	0.829	0.791	0.73	0.624		
1991 ENERGY:	1070	945	938	894	847	883	965	967	885	939	1026	1041	950	1990-1991	941
PEAK:	1362	1168	1215	1077	1092	1100	1234	1203	1074	1267	1228	1253	1362		1504
L.F.:	0.786	0.81	0.772	0.83	0.776	0.803	0.782	0.804	0.824	0.741	0.836	0.831	0.698		
1992 ENERGY:	1086	1026	951	898	895	914	961	957	900	945	997	1073	966	1991-1992	966
PEAK:	1412	1302	1208	1112	1133	1191	1231	1190	1123	1176	1284	1374	1412		1412
L.F.:	0.769	0.788	0.787	0.808	0.79	0.767	0.781	0.804	0.801	0.804	0.776	0.781	0.684		
1993 ENERGY:	1106	1042	966	912	909	928	976	971	914	960	1012	1090	982	1992-1993	975
PEAK:	1439	1327	1230	1133	1152	1210	1251	1209	1141	1199	1308	1400	1439		1439
L.F.:	0.769	0.785	0.785	0.805	0.789	0.767	0.78	0.803	0.801	0.801	0.774	0.779	0.682		
1994 ENERGY:	1135	1068	990	935	932	951	1002	995	937	984	1037	1118	1007	1993-1994	995
PEAK:	1475	1361	1262	1162	1183	1242	1285	1242	1171	1229	1341	1435	1475		1475
L.F.:	0.769	0.785	0.784	0.805	0.788	0.768	0.78	0.801	0.8	0.801	0.773	0.779	0.683		
1995 ENERGY:	1164	1096	1016	959	955	976	1029	1021	961	1009	1064	1147	1033	1994-1995	1020
PEAK:	1511	1394	1292	1190	1215	1276	1319	1276	1203	1259	1374	1470	1511		1511
L.F.:	0.77	0.786	0.786	0.806	0.786	0.765	0.78	0.8	0.799	0.801	0.774	0.78	0.684		
1996 ENERGY:	1192	1122	1040	982	979	999	1055	1046	984	1034	1090	1174	1058	1995-1996	1045
PEAK:	1546	1426	1322	1217	1245	1308	1353	1308	1233	1288	1405	1504	1546		1546
L.F.:	0.771	0.787	0.787	0.807	0.786	0.764	0.78	0.8	0.798	0.803	0.776	0.781	0.684		
1997 ENERGY:	1214	1143	1060	1000	997	1018	1076	1065	1003	1053	1110	1197	1078	1996-1997	1068
PEAK:	1573	1451	1345	1239	1270	1335	1380	1334	1258	1311	1430	1531	1573		1573
L.F.:	0.772	0.788	0.788	0.807	0.785	0.763	0.78	0.798	0.797	0.803	0.776	0.782	0.685		
1998 ENERGY:	1235	1162	1077	1017	1014	1035	1095	1083	1019	1071	1129	1217	1096	1997-1998	1087
PEAK:	1599	1475	1368	1259	1293	1358	1404	1358	1280	1332	1454	1556	1599		1599
L.F.:	0.772	0.788	0.787	0.808	0.784	0.762	0.78	0.797	0.796	0.804	0.776	0.782	0.685		
1999 ENERGY:	1252	1178	1092	1031	1027	1049	1110	1098	1033	1085	1144	1233	1111	1998-1999	1104
PEAK:	1621	1495	1386	1276	1311	1377	1424	1376	1298	1350	1474	1577	1621		1621
L.F.:	0.772	0.788	0.788	0.808	0.783	0.762	0.779	0.798	0.796	0.804	0.776	0.782	0.685		

TABLE 3
The Montana Power Company 1993
Forecast Firm Energy and Peak Load, in average MW and MW
2000-09, 1993 LEAST COST PLAN

CALENDAR YEAR

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann	OPERATING YEAR	
2000 ENERGY:	1267	1190	1103	1042	1038	1060	1122	1109	1044	1097	1156	1248	1123	1999-2000	1117
PEAK:	1640	1512	1402	1291	1325	1392	1439	1392	1312	1366	1491	1595	1640		1640
L.F.:	0.773	0.787	0.787	0.807	0.783	0.761	0.78	0.797	0.796	0.803	0.775	0.782	0.685		
2001 ENERGY:	1280	1202	1114	1052	1048	1070	1134	1120	1054	1107	1167	1260	1134	2000-2001	1129
PEAK:	1656	1527	1416	1304	1339	1407	1455	1407	1327	1380	1506	1611	1656		1656
L.F.:	0.773	0.787	0.787	0.807	0.783	0.76	0.779	0.796	0.794	0.802	0.775	0.782	0.685		
2002 ENERGY:	1292	1213	1124	1061	1058	1080	1144	1130	1063	1117	1178	1271	1144	2001-2002	1139
PEAK:	1671	1541	1429	1316	1351	1420	1468	1419	1338	1392	1519	1626	1671		1671
L.F.:	0.773	0.787	0.787	0.806	0.783	0.761	0.779	0.796	0.794	0.802	0.776	0.782	0.685		
2003 ENERGY:	1303	1223	1134	1070	1067	1089	1155	1140	1073	1127	1188	1282	1154	2002-2003	1149
PEAK:	1685	1554	1441	1327	1364	1433	1482	1433	1351	1404	1532	1639	1685		1685
L.F.:	0.773	0.787	0.787	0.806	0.782	0.76	0.779	0.796	0.794	0.803	0.775	0.782	0.685		
2004 ENERGY:	1315	1234	1144	1080	1076	1099	1165	1150	1082	1137	1198	1293	1164	2003-2004	1159
PEAK:	1700	1568	1454	1338	1376	1446	1495	1445	1363	1416	1546	1654	1700		1700
L.F.:	0.774	0.787	0.787	0.807	0.782	0.76	0.779	0.796	0.794	0.803	0.775	0.782	0.685		
2005 ENERGY:	1328	1245	1154	1090	1086	1109	1177	1161	1092	1147	1210	1305	1175	2004-2005	1170
PEAK:	1716	1583	1468	1351	1391	1461	1510	1460	1377	1430	1560	1670	1716		1716
L.F.:	0.774	0.786	0.786	0.807	0.781	0.759	0.779	0.795	0.793	0.802	0.776	0.781	0.685		
2006 ENERGY:	1346	1260	1168	1103	1099	1122	1192	1175	1105	1161	1224	1321	1189	2005-2006	1183
PEAK:	1740	1604	1488	1370	1409	1480	1530	1479	1395	1449	1582	1692	1740		1740
L.F.:	0.774	0.786	0.785	0.805	0.78	0.758	0.779	0.794	0.792	0.801	0.774	0.781	0.683		
2007 ENERGY:	1364	1275	1182	1116	1112	1135	1207	1188	1118	1175	1238	1336	1203	2006-2007	1197
PEAK:	1763	1626	1508	1388	1427	1499	1550	1498	1413	1469	1603	1715	1763		1763
L.F.:	0.774	0.784	0.784	0.804	0.779	0.757	0.779	0.793	0.791	0.8	0.772	0.779	0.682		
2008 ENERGY:	1383	1291	1197	1130	1126	1149	1223	1203	1132	1189	1254	1353	1219	2007-2008	1212
PEAK:	1788	1649	1529	1407	1446	1519	1571	1519	1432	1489	1625	1739	1788		1788
L.F.:	0.773	0.783	0.783	0.803	0.779	0.756	0.778	0.792	0.791	0.799	0.772	0.778	0.682		
2009 ENERGY:	1402	1307	1211	1144	1140	1164	1239	1218	1146	1204	1269	1370	1234	2008-2009	1227
PEAK:	1812	1671	1550	1427	1465	1539	1592	1539	1451	1510	1648	1763	1812		1812
L.F.:	0.774	0.782	0.781	0.802	0.778	0.756	0.778	0.791	0.79	0.797	0.77	0.777	0.681		

TABLE 3
The Montana Power Company 1993
Forecast Firm Energy and Peak Load, in average MW and MW
2010-15, 1993 LEAST COST PLAN

CALENDAR YEAR

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann	OPERATING YEAR	
2010 ENERGY:	1421	1323	1228	1157	1154	1178	1255	1233	1160	1218	1285	1386	1249	2009-2010	1242
PEAK:	1837	1694	1571	1446	1485	1560	1613	1559	1470	1530	1670	1787	1837		1837
L.F.:	0.774	0.781	0.78	0.8	0.777	0.755	0.778	0.791	0.789	0.796	0.769	0.776	0.68		
2011 ENERGY:	1444	1339	1242	1172	1168	1193	1272	1248	1175	1234	1301	1405	1266	2010-2011	1258
PEAK:	1868	1722	1597	1470	1505	1582	1635	1581	1491	1556	1698	1817	1868		1868
L.F.:	0.773	0.778	0.778	0.797	0.776	0.754	0.778	0.789	0.788	0.793	0.766	0.773	0.678		
2012 ENERGY:	1469	1358	1259	1188	1184	1209	1290	1265	1191	1251	1319	1425	1284	2011-2012	1275
PEAK:	1901	1753	1625	1496	1527	1605	1659	1604	1513	1583	1728	1849	1901		1901
L.F.:	0.773	0.775	0.775	0.794	0.775	0.753	0.778	0.789	0.787	0.79	0.763	0.771	0.675		
2013 ENERGY:	1493	1376	1276	1204	1200	1225	1309	1283	1207	1268	1337	1445	1301	2012-2013	1293
PEAK:	1932	1782	1652	1521	1550	1629	1684	1628	1536	1610	1757	1880	1932		1932
L.F.:	0.773	0.772	0.772	0.792	0.774	0.752	0.777	0.788	0.786	0.788	0.761	0.769	0.673		
2014 ENERGY:	1519	1396	1294	1221	1217	1243	1329	1301	1224	1286	1356	1466	1321	2013-2014	1312
PEAK:	1967	1814	1682	1548	1575	1654	1711	1654	1560	1639	1788	1913	1967		1967
L.F.:	0.772	0.77	0.769	0.789	0.773	0.752	0.777	0.787	0.785	0.785	0.758	0.766	0.672		
2015 ENERGY:	1544	1414	1311	1238	1233	1259	1348	1318	1240	1303	1374	1486	1339	2014-2015	1330
PEAK:	2000	1844	1710	1574	1598	1679	1736	1678	1583	1666	1818	1946	2000		2000
L.F.:	0.772	0.767	0.767	0.787	0.772	0.75	0.776	0.785	0.783	0.782	0.756	0.764	0.669		
2016 ENERGY:	1569	1434	1329	1255	1250	1277	1368	1336	1257	1321	1392	1507	1357	2015-2016	1349
PEAK:	2033	1875	1738	1601	1622	1704	1762	1704	1607	1694	1848	1978	2033		2033
L.F.:	0.772	0.765	0.765	0.784	0.771	0.749	0.776	0.784	0.782	0.78	0.753	0.762	0.667		

* Forecast starts in January 1992

PLAN 8S3
MPC RESOURCE PLAN
1/24/92
CONSERVATION = (SASA)

BUSINESS PLAN
THE MONTANA POWER COMPANY
ENERGY LOAD FORECAST & RESOURCE TABULATIONS

	YEAR:	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
1	ENERGY LOAD	934	956	974	1001	1018	1037	1052	1062	1067	1077	1091	1108	1121	1135	1155	1177
2	CONSERVATION	-2	-5	-14	-24	-36	-48	-60	-71	-81	-88	-93	-96	-101	-104	-106	-111
3	PACIFICORP SALE	15	15	10	10	10	0	0	0	0	0	0	0	0	0	0	0
4	BLACK HILLS SALE	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0
5	WWP SALE	36	36	36	28	0	0	0	0	0	0	0	0	0	0	0	0
6																	
7	NET TOTAL LOAD	984	1002	1006	1013	993	988	992	991	986	989	998	1009	1020	1031	1047	1066
8																	
9	FIRM RESOURCE																
10	HYDRO @ CRIT	335	335	335	335	335	335	335	335	335	335	335	335	335	335	335	335
11	CORETTE	122	122	122	122	122	122	122	122	122	122	122	122	122	78	0	0
12	COLSTRIP 1	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
13	COLSTRIP 2	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
14	COLSTRIP 3	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185
15	INTERRUPTIBLE	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
16	BPA(PKEN)	-29	-29	-29	-29	-29	-29	-29	-29	-29	-29	-15	0	0	0	0	0
17	WNP#1	87	87	67	67	87	29	0	0	0	0	0	0	0	0	0	0
18	MADISON OUTAGE	-7	-6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	IDAHO EXCHANGE	0	0	0	0	0	0	-6	0	0	0	0	0	0	0	0	0
20	FLINT CREEK	-1	-1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0
21	IDAHO PURCHASE	50	50	50	50	50	13	0	0	0	0	0	0	0	0	0	0
22																	
23	SUBTOTAL	875	878	862	863	863	806	860	866	866	866	860	895	885	851	773	773
24																	
25	+ OR -	-8	-28	-28	-30	-10	-80	-132	-125	-120	-123	-118	-114	-125	-180	-274	-293
26																	
27	OF	40	40	40	81	78	78	78	78	78	78	78	78	78	78	78	78
28																	
29	+ OR -	31	14	14	31	66	-4	-56	-49	-44	-47	-42	-36	-49	-104	-196	-217
30																	
31	TENTATIVE	18	27	31	31	23	25	66	69	69	82	76	66	67	112	192	185
32																	
33	S-T PURCHASE '91	18	27	31	31	23	25	14	0	0	0	0	0	0	0	0	0
34	MADISON '96 3/2/2	0	0	0	0	0	1	3	3	3	3	3	3	3	3	3	3
35	RAINBOW '97 16/15/15	0	0	0	0	0	0	0	16	16	16	16	16	16	16	16	16
36	HAUSER '00 3/3/3	0	0	0	0	0	0	0	0	0	3	3	3	3	3	3	3
37	MILLTOWN '02 1/1/1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
38	ID EXCH EXT '96 0/50/50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	THOMPSON '97 16/50/10	0	0	0	0	0	0	16	16	16	16	16	16	16	16	16	16
40	BIRD '97 50/60/60	0	0	0	0	0	0	50	50	50	50	50	50	50	50	50	50
41	RYAN '96 1/43/45	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
42	COR LIFE OPT '04 122/180/1(	0	0	0	0	0	0	0	0	0	0	0	0	0	44	122	122
43	CT #1 '97 3/42/42	0	0	0	0	0	0	3	3	3	3	3	3	3	3	3	3
44	CT #2 '02 3/42/42	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3
45	CT#3 '05 3/42/42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3
46	CT#4 '06 3/42/42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
47	PUMPED STOR '01 -29/100/1(	0	0	0	0	0	0	0	0	0	0	-15	-29	-29	-29	-29	-29
48	PUMPED STOR '97 0/50/50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60																	
61	+ OR -	47	41	45	82	89	21	30	40	45	45	36	28	18	8	-6	-22

PLAN 6S3
MPC RESOURCE PLAN
1/24/92
CONSERVATION = (SASA)

BUSINESS PLAN
THE MONTANA POWER COMPANY
JANUARY PEAK LOAD FORECAST & RESOURCE TABULATIONS

	YEAR:	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
1	PEAK LOAD(CRIT WATER)	1425	1455	1485	1521	1550	1575	1596	1614	1628	1643	1663	1687	1713	1735	1765	1798
2	CONSERVATION	-2	-8	-18	-28	-42	-57	-71	-85	-98	-108	-118	-123	-129	-135	-141	-148
3	PACIFICORP SALE	15	15	10	10	10	0	0	0	0	0	0	0	0	0	0	0
4	BLACK HILLS SALE	20	25	30	0	0	0	0	0	0	0	0	0	0	0	0	0
5	WWP SALE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6																	
7	NET TOTAL LOAD	1458	1487	1509	1503	1518	1518	1527	1529	1528	1535	1547	1564	1584	1600	1624	1652
8																	
9	FIRM RESOURCE																
10	HYDRO @ CRIT	469	469	469	469	469	469	469	469	469	469	469	469	469	469	469	469
11	CORETTE	160	160	160	160	160	160	160	160	160	160	160	160	160	160	0	0
12	COLSTRIP 1	159	159	159	159	159	159	159	159	159	159	159	159	159	159	159	159
13	COLSTRIP 2	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160
14	COLSTRIP 3	218	218	218	218	218	218	218	218	218	218	218	218	218	218	218	218
15	INTERRUPTIBLE	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64
16	BPA(PK/EN)	100	100	100	100	100	100	100	100	100	100	100	0	0	0	0	0
17	WNP#1	79	79	79	79	79	79	0	0	0	0	0	0	0	0	0	0
18	MADISON OUTAGE	-8	-8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	IDAHO EXCHANGE	50	50	50	50	50	50	50	0	0	0	0	0	0	0	0	0
20	FLINT CREEK	-1	-1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0
21	IDAHO PURCHASE	75	75	75	75	75	75	0	0	0	0	0	0	0	0	0	0
22																	
23	SUBTOTAL	1545	1545	1553	1554	1554	1554	1400	1350	1350	1350	1350	1250	1250	1250	1090	1090
24																	
25	+ OR -	87	58	44	51	36	36	-127	-179	-178	-185	-197	-314	-334	-350	-534	-562
26																	
27	F.O.RESERVE	199	203	206	209	211	213	214	214	214	215	217	219	222	224	227	231
28																	
29	+ OR -	-112	-145	-162	-158	-175	-177	-341	-393	-392	-400	-414	-533	-556	-574	-761	-793
30																	
31	OF RESOURCE	42	42	42	42	64	64	64	64	64	64	64	64	64	64	64	64
32																	
33	+ OR -	-70	-103	-120	-116	-81	-83	-257	-309	-308	-316	-330	-449	-472	-490	-677	-709
34																	
35	TENTATIVE	60	100	115	115	85	93	256	312	312	312	315	457	458	458	660	702
36																	
37	S-T PURCHASE '91	60	100	115	115	85	93	52	0	0	0	0	0	0	0	0	0
38	MADISON '96 3/2/2	0	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2
39	RAINBOW '97 15/15/15	0	0	0	0	0	0	0	15	15	15	15	15	15	15	15	15
40	HAUSER '00 3/3/3	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3	3
41	MILLTOWN '02 1/1/1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
42	ID EXCH EXT '96 0/50/ 50	0	0	0	0	0	0	0	50	50	50	50	50	50	50	50	50
43	THOMPSON '97 16/50/10	0	0	0	0	0	0	50	50	50	50	50	50	50	50	50	50
44	BIRD '97 50/60/60	0	0	0	0	0	0	60	60	60	60	60	60	60	60	60	60
45	RYAN '96 1/43/45	0	0	0	0	0	0	0	43	43	43	43	43	43	43	43	43
46	COR LIFE OPT '04 122/160/160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	160	160
47	CT #1 '97 3/42/42	0	0	0	0	0	0	42	42	42	42	42	42	42	42	42	42
48	CT #2 '02 3/42/42	0	0	0	0	0	0	0	0	0	0	0	42	42	42	42	42
49	CT#3 '05 3/42/42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	42
50	CT#4 '06 3/42/42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42
51	PUMPED STOR '01 -29/100/100	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100
52	PUMPED STOR '97 0/50/50	0	0	0	0	0	0	50	50	50	50	50	50	50	50	50	50
53	-	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0
54	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	-	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
56	-	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
57	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63																	
64	+ OR -	-10	-3	-5	-1	-6	0	-1	3	4	-4	-14	8	-14	-32	-17	-7

TABLE 4

The Montana Power Company
Historical Firm Energy and Peak Load, in aMW and MW
1990-99, 1992 LEAST COST PLAN

	CALENDAR YEAR													Operating	Year
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann	Year	Opr
1990 ENERGY:	1004	984	904	872	857	922	964	914	876	913	946	1098	938	1989-1990	926
PEAK:	1300	1322	1189	1106	1064	1188	1190	1164	1144	1101	1196	1504	1504		1370
L.F.:	0.772	0.744	0.76	0.788	0.805	0.776	0.81	0.785	0.766	0.829	0.791	0.73	0.624		
1991 ENERGY:	1044	997	927	848	864	886	938	909	873	903	979	1041	934	1990-1991	940
PEAK:	1424	1370	1190	1105	1087	1113	1172	1141	1074	1127	1151	1343	1424		1504
L.F.:	0.733	0.728	0.779	0.767	0.795	0.796	0.8	0.797	0.813	0.801	0.851	0.775	0.656		
1992 ENERGY:	1068	1020	947	866	885	906	964	932	894	924	1001	1063	955	1991-1992	945
PEAK:	1456	1402	1217	1130	1114	1137	1202	1170	1101	1151	1178	1374	1456		1456
L.F.:	0.734	0.728	0.778	0.766	0.794	0.797	0.802	0.797	0.812	0.803	0.851	0.774	0.656		
1993 ENERGY:	1089	1040	964	880	902	923	985	950	912	942	1020	1082	974	1992-1993	965
PEAK:	1486	1431	1240	1149	1136	1158	1226	1192	1123	1173	1198	1402	1486		1486
L.F.:	0.733	0.727	0.777	0.766	0.794	0.797	0.803	0.797	0.812	0.803	0.851	0.772	0.655		
1994 ENERGY:	1116	1067	989	901	928	947	1016	978	938	968	1046	1107	1000	1993-1994	987
PEAK:	1521	1467	1272	1177	1170	1186	1261	1227	1157	1202	1226	1436	1521		1521
L.F.:	0.734	0.727	0.778	0.768	0.793	0.798	0.806	0.797	0.811	0.805	0.853	0.771	0.657		
1995 ENERGY:	1137	1087	1006	917	946	965	1038	998	956	988	1066	1126	1019	1994-1995	1009
PEAK:	1550	1496	1295	1199	1193	1208	1286	1252	1179	1223	1249	1464	1550		1550
L.F.:	0.734	0.727	0.777	0.765	0.793	0.799	0.807	0.797	0.811	0.806	0.853	0.769	0.657		
1996 ENERGY:	1156	1106	1022	930	962	980	1058	1015	973	1003	1083	1143	1035	1995-1996	1027
PEAK:	1575	1522	1317	1217	1214	1226	1309	1273	1201	1242	1268	1488	1575		1575
L.F.:	0.734	0.727	0.776	0.764	0.792	0.799	0.808	0.797	0.81	0.808	0.854	0.768	0.657		
1997 ENERGY:	1173	1123	1037	943	978	995	1077	1032	988	1019	1099	1159	1051	1996-1997	1044
PEAK:	1598	1546	1338	1234	1235	1244	1330	1294	1220	1260	1285	1511	1598		1598
L.F.:	0.734	0.726	0.778	0.764	0.792	0.8	0.81	0.798	0.81	0.809	0.855	0.767	0.658		
1998 ENERGY:	1185	1133	1046	951	987	1004	1089	1042	998	1029	1110	1169	1061	1997-1998	1057
PEAK:	1615	1561	1349	1245	1247	1255	1344	1307	1233	1272	1298	1526	1615		1615
L.F.:	0.734	0.726	0.775	0.764	0.791	0.8	0.81	0.797	0.809	0.809	0.855	0.766	0.657		
1999 ENERGY:	1191	1138	1050	953	991	1008	1094	1046	1001	1033	1114	1174	1066	1998-1999	1064
PEAK:	1625	1570	1356	1248	1252	1260	1350	1312	1237	1278	1304	1535	1625		1625
L.F.:	0.733	0.725	0.774	0.764	0.792	0.8	0.81	0.797	0.809	0.808	0.854	0.765	0.656		

TABLE 5

1992 Forecast

The Montana Power Company
Historical Firm Energy and Peak Load, in aMW and MW
2000-09, 1992 LEAST COST PLAN

	CALENDAR YEAR													Operating	Year
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann	Year	Opr
2000 ENERGY:	1204	1150	1060	962	1001	1018	1107	1057	1012	1043	1125	1186	1077	1999 2000	1071
PEAK:	1644	1587	1370	1260	1265	1272	1365	1325	1251	1289	1317	1552	1644		1644
L.F.:	0.732	0.725	0.774	0.763	0.791	0.8	0.811	0.798	0.809	0.809	0.854	0.764	0.655		
2001 ENERGY:	1218	1164	1072	972	1013	1029	1122	1071	1024	1056	1139	1199	1089	2000-2001	1083
PEAK:	1663	1608	1386	1274	1281	1285	1382	1343	1266	1305	1333	1571	1663		1663
L.F.:	0.732	0.724	0.773	0.763	0.791	0.801	0.812	0.797	0.809	0.809	0.854	0.763	0.655		
2002 ENERGY:	1235	1180	1086	984	1028	1043	1140	1086	1039	1071	1154	1214	1105	2001-2002	1097
PEAK:	1687	1631	1406	1290	1300	1302	1402	1361	1285	1322	1350	1594	1687		1687
L.F.:	0.732	0.723	0.772	0.763	0.791	0.801	0.813	0.798	0.809	0.81	0.855	0.762	0.655		
2003 ENERGY:	1253	1196	1100	995	1042	1057	1158	1102	1053	1086	1169	1230	1120	2002-2003	1112
PEAK:	1712	1655	1425	1305	1319	1319	1423	1381	1303	1340	1368	1617	1712		1712
L.F.:	0.732	0.723	0.772	0.762	0.79	0.801	0.814	0.798	0.808	0.81	0.855	0.761	0.654		
2004 ENERGY:	1269	1211	1113	1006	1055	1069	1175	1116	1067	1099	1184	1244	1134	2003-2004	1127
PEAK:	1735	1677	1443	1320	1336	1333	1442	1399	1321	1355	1385	1638	1735		1735
L.F.:	0.731	0.722	0.771	0.762	0.79	0.802	0.815	0.798	0.808	0.811	0.855	0.759	0.654		
2005 ENERGY:	1291	1232	1132	1022	1075	1088	1199	1137	1086	1119	1204	1264	1154	2004-2005	1144
PEAK:	1765	1706	1469	1342	1362	1356	1469	1425	1345	1378	1407	1668	1765		1765
L.F.:	0.731	0.722	0.771	0.762	0.789	0.802	0.816	0.798	0.807	0.812	0.856	0.758	0.654		
2006 ENERGY:	1316	1257	1153	1040	1097	1109	1227	1161	1109	1142	1227	1288	1177	2005-2006	1165
PEAK:	1799	1742	1497	1366	1391	1381	1501	1454	1374	1404	1433	1699	1799		1799
L.F.:	0.732	0.722	0.77	0.761	0.789	0.803	0.817	0.798	0.807	0.813	0.856	0.757	0.654		
2007 ENERGY:	1340	1280	1173	1058	1118	1129	1253	1184	1131	1163	1250	1308	1198	2006-2007	1188
PEAK:	1832	1774	1524	1391	1418	1405	1530	1483	1402	1428	1459	1731	1832		1832
L.F.:	0.731	0.722	0.77	0.761	0.788	0.804	0.819	0.798	0.807	0.814	0.857	0.756	0.654		
2008 ENERGY:	1363	1303	1193	1074	1139	1149	1279	1206	1151	1184	1271	1329	1220	2007-2008	1209
PEAK:	1863	1807	1551	1413	1446	1429	1559	1510	1428	1452	1482	1762	1863		1863
L.F.:	0.732	0.721	0.769	0.76	0.788	0.804	0.82	0.799	0.806	0.815	0.858	0.754	0.655		
2009 ENERGY:	1382	1320	1207	1086	1154	1163	1298	1223	1167	1200	1287	1345	1236	2008-2009	1228
PEAK:	1890	1832	1571	1429	1466	1445	1580	1531	1449	1470	1501	1786	1890		1890
L.F.:	0.731	0.721	0.768	0.76	0.787	0.805	0.822	0.799	0.805	0.816	0.857	0.753	0.654		

TABLE 5

1992 Forecast

The Montana Power Company

Historical Firm Energy and Peak Load, in aMW and MW

2010-15, 1992 LEAST COST PLAN

	CALENDAR YEAR													Operating Year	Year Opr
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann		
2010 ENERGY:	1410	1347	1231	1107	1179	1187	1330	1250	1192	1225	1314	1371	1261	2009-2010	1248
PEAK:	1927	1870	1602	1458	1498	1474	1616	1565	1481	1498	1531	1824	1927		1927
L.F.:	0.732	0.72	0.768	0.759	0.787	0.805	0.823	0.799	0.805	0.818	0.858	0.752	0.654		
2011 ENERGY:	1443	1380	1260	1131	1210	1216	1369	1283	1223	1256	1345	1400	1293	2010-2011	1277
PEAK:	1971	1916	1641	1491	1539	1508	1659	1606	1520	1533	1565	1865	1971		1971
L.F.:	0.732	0.72	0.768	0.759	0.786	0.806	0.825	0.799	0.805	0.819	0.859	0.751	0.656		
2012 ENERGY:	1470	1407	1283	1151	1234	1239	1399	1310	1248	1281	1370	1425	1318	2011-2012	1305
PEAK:	2008	1954	1672	1518	1571	1536	1692	1639	1552	1561	1593	1902	2008		2008
L.F.:	0.732	0.72	0.767	0.758	0.785	0.807	0.827	0.799	0.804	0.821	0.86	0.749	0.656		
2013 ENERGY:	1492	1427	1300	1165	1252	1256	1423	1330	1266	1299	1389	1444	1336	2012-2013	1327
PEAK:	2039	1983	1695	1538	1594	1556	1719	1664	1575	1582	1614	1931	2039		2039
L.F.:	0.732	0.72	0.767	0.757	0.785	0.807	0.828	0.799	0.804	0.821	0.861	0.748	0.655		
2014 ENERGY:	1521	1456	1325	1186	1279	1281	1456	1358	1293	1326	1417	1470	1364	2013-2014	1350
PEAK:	2078	2024	1729	1566	1630	1585	1756	1698	1610	1612	1645	1969	2078		2078
L.F.:	0.732	0.719	0.766	0.757	0.785	0.808	0.829	0.8	0.803	0.823	0.861	0.747	0.656		
2015 ENERGY:	1544	1478	1344	1202	1299	1300	1482	1380	1314	1347	1438	1491	1384	2014-2015	1374
PEAK:	2110	2056	1755	1588	1656	1608	1785	1726	1637	1636	1669	2000	2110		2110
L.F.:	0.732	0.719	0.766	0.757	0.784	0.808	0.83	0.8	0.803	0.823	0.862	0.745	0.656		

* Forecast starts in January 1991

MONTANA POWER COMPANY - RESOURCE PLANNING 12/01/92
SUMMARY OF 1993 OFF-SYSTEM SALES FORECAST - USING 5% GAS PRICE ESCALATION

	PRIOR HISTORY (MILLS)		1992 BASE FORECAST	1993 BASE FORECAST	95% CONFIDENCE INTERVAL UPPER LIMIT	LOWER LIMIT	1991 BPA MED NR RATE
1970 h	3.8	1992 f	20.0	23.0	25.9	15.4	34.0
1971 h	2.7	1993 f	20.4	21.8	29.3	18.1	34.0
1972 h	2.8	1994 f	22.8	22.7	28.4	16.8	35.5
1973 h	9.1	1995 f	26.0	25.3	30.2	17	37.3
1974 h	5.6	1996 f	27.3	26.1	33.6	19	40.5
1975 h	7.3	1997 f	28.8	26.9	34.7	19.6	42.7
1976 h	7.7	1998 f	30.5	27.7	35.8	20.2	44.8
1977 h	11.6	1999 f	32.4	28.6	36.9	20.8	47.3
1978 h	14.9	2000 f	35.4	30.1	38.2	21.5	49.9
1979 h	23.9	2001 f	35.0	28.9	39.1	23.1	51.9
1980 h	32.8	2002 f	34.5	27.8	36.9	22.7	55.0
1981 h	30.9	2003 f	36.9	29.1	35.5	21.7	57.6
1982 h	20.3	2004 f	39.4	30.5	37.1	22.8	60.1
1983 h	14.7	2005 f	42.0	32.1	39	23.9	62.8
1984 h	17.6	2006 f	44.9	33.7	41	25	67.4
1985 h	23.0	2007 f	48.1	35.4	43.1	26.3	73.4
1986 h	13.3	2008 f	51.4	37.2	45.2	27.6	75.4
1987 h	15.2	2009 f	54.9	39.2	47.6	29	79.6
1988 h	18.7	2010 f	58.5	41.3	50.1	30.6	84.6
1989 h	21.9	2011 f	62.2	43.4	52.8	32.3	87.4
1990 h	20.90	2012 f	66.2	45.8	55.5	34	90.9
1991 h	20.39	2013 f	70.5	48.2	58.5	35.9	
		2014 f	75.1	50.8	61.7	37.8	
		2015 f	80.0	53.6	64.9	39.7	
		2016 f		56.4	68.5	41.9	
	A		B	C			D

A. HISTORICAL OFF SYSTEM SALES MILLS/KWH.

B. 1992 BASE FORECAST

C. DETERMINED FROM 1981-1991 DATA
COMPOUND ANNUAL GROWTH RATE 3.8%

D. BPA'S NOVEMBER 1991 MEDIAN FORECAST FOR WHOLESALE POWER RATE.

TABLE 6

A. ESTIMATED FUEL COSTS FOR CALIFORNIA GENERATING PLANTS (EQUIVALENT $/BARREL OF OIL, NOMINAL)
1970-1985: DRI U.S. REFINERS ACQUISITION PRICE FOR CRUDE OIL - FOREIGN
FROM TABLE 18, "ENERGY", DRI, FALL 1989
1986-1991: CALIFORNIA GAS SPOT PRICE (delivered to utility) FROM NATURAL GAS WEEK.
1992-1995: NATURAL GAS PRICE ESTIMATED USING DRI INDEX.
1996-2016: NATURAL GAS PRICE ESCALATED AT 5% ANNUALLY.

B. DRI PERSONAL CONSUMPTION DEFLATOR - ELECTICITY (PERCENT CHANGE)
1970-1988: FROM TABLE 16, "PRICES, WAGES AND PRODUCTIVITY", DRI, FALL 1989
1989- TRENDLONG1090, 1990-91- TRENDLONG1191
1992-2016: FROM TABLE 17 "PERSONAL CONSUMPTION DEFLATOR (ELECTRICITY) - TREND25YR0291", DRI, SUMMER 1992.

C. DEFLATOR INDEX
1970-1990: COLUMN Ct = (COLUMN Ct+1) / (1 + (COLUMN Bt+1/100))
1992-2016: COLUMN Ct = (COLUMN Ct-1) * (1 + (COLUMN Bt/100))
WHERE t = YEAR

D. FUEL OF CHOICE PRICE EXPRESSED AS THE BTU EQUIVALENT OF A BARREL OF OIL
COLUMN D = (COLUMN A / COLUMN C)

E. THE DALLES NATURAL FLOW (MAF), JANUARY THRU DECEMBER
1970-1991: ACTUALS.
1992: BASED ON 8 MONTHS ACTUAL AND 4 MONTHS ESTIMATED
1993: ESTIMATED TO BE MIDPOINT OF 1992 FLOWS AND THE LONG TERM AVERAGE
1994-2016: AVERAGE OF 1925-1989 FLOWS.

F. OFF SYSTEM SALES PRICE; ACTUAL WEIGHTED AVERAGE IN MILLS/KWH (91$)
COLUMN F = (COLUMN G / COLUMN C)

G. ANNUAL WEIGHTED AVERAGE OFF SYSTEM SALES PRICE; MILLS/KWH (NOMINAL) AS RECEIVED FROM SOCC

H. OFF SYSTEM SALE PRICE OF ELECTRICITY; FORECAST MILLS/KWH (91$)
DEVELOPED BY THE REGRESSION EQUATION:
ln(MILLS/KWH) = 2.6963 + .000551($/BARREL**2) - .00337(Dalles Nll Flow) + .09103(TREND VARIABLE)

I. 1993 OFF SYSTEM SALE PRICE OF ELECTRICITY; BASE FORECAST MILLS/KWH (NOMINAL)
COLUMN I = (COLUMN H * COLUMN C)

J. COLUMN D * COLUMN D

K. TREND VARIABLE USED AS AN INDICATOR OF THE ENERGY BALANCE IN THE NORTHWEST REGION.
THIS TREND BEGAN IN THE MID 80'S AND WILL REACH ITS HIGHEST VALUE IN THE 1996 TO 2000 TIME PERIOD

L. NATURAL LOG OF COLUMN F

TECH7.WK1

THE MONTANA POWER COMPANY

RFP #91- RESOURCE SUMMARY INDEX
ORDERED BY SCREENING RATIO AND ID
EEAF'S AS PROPOSED BY SPONSOR

BASE YEAR 1991

	FUEL TYPE	CAPABILITY PEAK (MW)	CAPABILITY ENERGY (aMW)	BENEFIT/ COST RATIO	EEAF	DIST. FACT.	SCREEN RATIO
1	Waste Coal	80.0	75.2	1.77	1.020	1.00	1.73
2	Coal	98.0	41.7	1.69	1.000	1.00	1.69
3	Coal	98.0	41.7 *	1.63	1.000	1.00	1.63
4	Natural Gas	38.4	34.9	1.57	1.000	1.00	1.57
5	Steam	14.5	13.2	1.55	1.000	1.00	1.55
6	Coal & Natural Gas	194.0	151.8	1.55	1.080	1.00	1.44
7	Coal	161.0	140.8	1.55	1.080	1.00	1.43
8	Coal & Natural Gas	227.0	162.8	1.54	1.080	1.00	1.43
9	Natural Gas	92.0	86.3	1.42	1.030	1.00	1.38
10	Petroleum Coke	68.4	59.7	1.43	1.050	1.00	1.36
11	Petroleum Coke	68.4	59.7	1.43	1.050	1.00	1.36
12	Waste Coal	92.0	77.9	1.42	1.080	1.00	1.31
13	Coal	124.5	115.8	1.44	1.110	1.00	1.30
14	Waste Coal & N.G.	158.0	99.8	1.40	1.080	1.00	1.30
15	Natural Gas	118.9	102.8	1.32	1.020	1.00	1.29
16	Natural Gas	158.0	108.2	1.33	1.030	1.00	1.29
17	Waste Coal & N.G.	125.0	88.8	1.39	1.080	1.00	1.29
18	Natural Gas	125.0	97.3	1.32	1.030	1.00	1.28
19	Coal	114.0	43.0	1.27	1.000	1.00	1.27
20	Natural Gas	99.0	92.2 *	1.29	1.020	1.00	1.27
21	Natural Gas	121.2	107.9	1.24	1.000	1.00	1.24
22	Natural Gas	41.6	39.2	1.23	1.010	1.00	1.21
23	Waste Coal	40.0	35.2	1.37	1.130	1.00	1.21
24	Waste Coal	40.0	35.2	1.36	1.130	1.00	1.20
25	Natural Gas	113.3	101.0	1.20	1.000	1.00	1.20
26	Natural Gas	156.0	132.7 *	1.20	1.000	1.00	1.20
27	Natural Gas	156.0	132.7 *	1.20	1.000	1.00	1.20
28	Natural Gas	156.0	132.7 *	1.20	1.000	1.00	1.20
29	Natural Gas	156.0	132.7 *	1.20	1.000	1.00	1.20
30	Natural Gas	140.0	119.0	1.22	1.020	1.00	1.19
31	Hydro	5.2	5.0 *	1.19	1.000	1.00	1.19
32	Coal	114.0	85.9	1.19	1.000	1.00	1.19
33	Natural Gas	128.9	123.7	1.20	1.020	1.00	1.17
34	Natural Gas	113.5	102.8	1.17	1.000	1.00	1.17
35	Natural Gas	111.3	94.1	1.18	1.020	1.00	1.16
36	DSM	2.0	0.8	1.09	1.000	1.06	1.15
37	Natural Gas	88.0	76.5	1.15	1.010	1.00	1.13
38	Natural Gas	41.6	39.2	1.14	1.010	1.00	1.13
39	Natural Gas	49.1	47.1	1.14	1.020	1.00	1.11
40	Wind	20.4	10.7 *	1.10	1.000	1.00	1.10

*Energy shown is firm energy. Nonfirm energy is available.

THE MONTANA POWER COMPANY

RFP #91- RESOURCE SUMMARY INDEX
ORDERED BY SCREENING RATIO AND ID
EEAF'S AS PROPOSED BY SPONSOR

BASE YEAR 1991

	FUEL TYPE	CAPABILITY PEAK (MW)	CAPABILITY ENERGY (aMW)		BENEFIT/ COST RATIO	EEAF	DIST. FACT.	SCREEN RATIO
41	Geothermal	20.0	12.5		1.09	1.000	1.00	1.09
42	Natural Gas	48.8	46.9		1.10	1.020	1.00	1.08
43	Natural Gas	42.9	41.2		1.08	1.010	1.00	1.07
44	Natural Gas	24.9	23.9		1.09	1.020	1.00	1.07
45	Waste Coal	40.0	35.2		1.20	1.130	1.00	1.06
46	Natural Gas	150.0	139.6		1.11	1.050	1.00	1.06
47	DSM	3.0	1.4		1.00	1.000	1.06	1.06
48	Natural Gas	48.9	46.9		1.08	1.020	1.00	1.06
49	Waste Coal	40.0	35.2		1.18	1.130	1.00	1.05
50	Natural Gas	44.5	42.7		1.05	1.020	1.00	1.03
51	Natural Gas	220.0	201.9		1.05	1.020	1.00	1.03
52	Geothermal	20.0	12.5		1.01	1.000	1.00	1.10
53	Natural Gas	52.3	44.0		1.05	1.050	1.00	1.00
54	Natural Gas	24.9	23.9		1.02	1.020	1.00	1.00
55	Natural Gas	24.9	23.9		1.02	1.020	1.00	1.00
56	Natural Gas	24.9	23.9		1.01	1.020	1.00	0.99
57	Natural Gas	220.0	201.9		1.00	1.020	1.00	0.98
58	Waste Coal & N.G.	112.0	62.2		1.06	1.080	1.00	0.98
59	Hydro	1.2	4.6	*	0.96	1.000	1.00	0.96
60	Natural Gas	24.9	23.9		0.98	1.020	1.00	0.96
61	Geothermal	20.0	18.0		0.95	1.000	1.00	0.95
62	Natural Gas	35.6	35.4		0.96	1.020	1.00	0.94
63	Natural Gas	35.6	35.4		0.96	1.020	1.00	0.94
64	Hydro	100.0	38.1		0.94	1.000	1.00	0.94
65	Waste Coal	46.0	40.3		1.01	1.080	1.00	0.93
66	Wind	51.8	23.6	*	0.93	1.000	1.00	0.93
67	Wind	20.8	9.4	*	0.93	1.000	1.00	0.93
68	Wind	44.8	24.8	*	0.93	1.000	1.00	0.93
69	Wind	17.8	9.9	*	0.93	1.000	1.00	0.93
70	Waste Coal & N.G.	79.0	51.3		0.99	1.080	1.00	0.92
71	Wind	20.4	10.7	*	0.91	1.000	1.00	0.91
72	Wind	20.4	10.7	*	0.91	1.000	1.00	0.91
73	Natural Gas	107.9	92.8		0.89	1.020	1.00	0.88
74	System	100.0	30.0		0.87	1.000	1.00	0.87
75	Natural Gas	57.6	53.6		0.86	1.050	1.00	0.82
76	Natural Gas	38.4	33.5		0.83	1.020	1.00	0.81
77	Natural Gas	107.9	70.3		0.82	1.020	1.00	0.81
78	Hydro	0.1	0.8	*	0.80	1.000	1.00	0.80
79	Natural Gas	48.0	47.2		0.82	1.050	1.00	0.78
80	Hydro	54.9	33.2	*	0.76	1.000	1.00	0.76
81	Hydro	250.0	103.1		0.75	1.000	1.00	0.75
82	Wind	4.3	3.9	*	0.75	1.000	1.00	0.75

*Energy shown is firm energy. Nonfirm energy is available.

THE MONTANA POWER COMPANY

RFP #91- RESOURCE SUMMARY INDEX
ORDERED BY SCREENING RATIO AND ID
EEAF'S AS PROPOSED BY SPONSOR

BASE YEAR 1991

FUEL TYPE	CAPABILITY PEAK (MW)	CAPABILITY ENERGY (aMW)	BENEFIT/ COST RATIO	EEAF	DIST. FACT.	SCREEN RATIO
83 Wind	12.7	11.5 *	0.70	1.000	1.00	0.70
84 Natural Gas	8.8	5.7	0.71	1.010	1.00	0.70
85 Wind	6.9	3.8 *	0.70	1.000	1.00	0.70
86 Wind	20.1	11.1 *	0.66	1.000	1.00	0.66
87 Coal	108.0	44.1	0.64	1.000	1.00	0.64
88 Wind	8.6	3.4 *	0.61	1.000	1.00	0.61
89 Wind	4.8	2.4 *	0.59	1.000	1.00	0.59
90 Wind	10.1	3.1 *	0.57	1.000	1.00	0.57
91 Wind	10.1	3.1 *	0.57	1.000	1.00	0.57
92 Hydro	0.0	1.4	0.45	1.000	1.00	0.45
93 Wind	4.8	2.4		1.000	1.00	0.00

*Energy shown is firm energy. Nonfirm energy is available.

SORT BY R3 RATIO

05/11/92

		AS BID INFORMATION				USING MPC DATA									
BID #	TECHNOLOGY	RANK	BID B/C	Place	BID "R"	Place	MPC B/C	Place	MPC R1	Place	MPC R2	Place	MPC R3	Place	MPC R4
4S	MPC DSM***	1	2.68	1	2.83	1	2.68	1	2.83	1	2.83	1	2.83	1	2.83
2SA	MPC DSM***	2	2.33	2	2.46	2	2.33	2	2.46	2	2.46	2	2.46	2	2.46
4A	MPC DSM***	3	2.24	3	2.37	3	2.24	3	2.37	3	2.37	3	2.37	3	2.37
BDa	BIRD	5	1.67	6	1.56	6	1.67	6	1.67	4	1.67	4	1.60	5	1.60
6A	SURPLS PC	6	1.65	5	1.65	4	1.87	4	1.87	7	1.59	5	1.59	4	1.87
IXB	EX/IPC2	7	1.60	10	1.49	7	1.60	7	1.60	6	1.60	6	1.54	6	1.54
IXA	EX/IPC1	9	1.54	8	1.54	9	1.54	9	1.54	8	1.54	6	1.54	6	1.54
BDb	BRD&H2O	9	1.54	8	1.54	9	1.54	9	1.54	8	1.54	6	1.54	6	1.54
RYN	RYAN	14	1.41	13	1.41	10	1.53	10	1.53	9	1.53	7	1.53	7	1.53
1	CC	4	1.74	4	1.71	5	1.74	5	1.74	5	1.61	8	1.48	5	1.60
TFd	T.FALL	12	1.43	11	1.43	13	1.43	13	1.43	10	1.43	9	1.43	9	1.43
TFa	R-O-R	12	1.43	11	1.43	13	1.43	13	1.43	10	1.43	10	1.42	10	1.42
C	CT	8	1.55	7	1.55	8	1.55	8	1.55	11	1.41	11	1.38	8	1.51
B	PRESR REDCE	10	1.53	9	1.53	10	1.53	10	1.53	12	1.39	12	1.37	8	1.51
AEX	EX/APS	29	1.07	31	1.07	20	1.34	19	1.34	13	1.34	13	1.34	13	1.34
35A	CFBC	14	1.41	16	1.34	14	1.41	14	1.41	14	1.28	14	1.19	15	1.31
66A	CC *	15	1.40	15	1.36	15	1.40	14	1.41	15	1.20	15	1.16	12	1.37
65C	PC+CT *	11	1.51	14	1.40	9	1.54	9	1.54	16	1.19	16	1.12	9	1.43
66C	CC+CT *	19	1.31	19	1.27	20	1.34	18	1.35	18	1.15	16	1.12	16	1.30
65B	PC+CT *	10	1.53	12	1.42	9	1.54	9	1.54	17	1.18	17	1.11	9	1.43
28	CC	25	1.18	27	1.16	25	1.20	24	1.20	19	1.13	18	1.10	24	1.17
14	R-O-R	10	1.53	12	1.42	11	1.52	11	1.52	18	1.15	19	1.09	11	1.40
65A	PC *	26	1.17	26	1.17	26	1.17	26	1.17	21	1.09	19	1.09	23	1.18
66B	CC+CT *	20	1.30	20	1.26	21	1.32	20	1.33	21	1.09	20	1.06	18	1.28
13	PC	13	1.42	18	1.28	12	1.45	12	1.45	19	1.13	20	1.06	14	1.33
45	CFBC	17	1.35	24	1.19	17	1.37	16	1.37	20	1.12	21	1.04	19	1.26
33B	SURPLS PC	22	1.22	22	1.22	23	1.22	22	1.22	26	1.03	22	1.03	20	1.22
68C	CFBC+CT *	21	1.26	21	1.24	22	1.24	21	1.24	24	1.05	23	1.02	22	1.19
21	CC	16	1.37	19	1.27	16	1.39	15	1.39	22	1.08	23	1.02	17	1.29
69	CC	28	1.15	28	1.15	28	1.13	28	1.13	23	1.06	24	1.00	29	1.06
A	DSM	29	1.07	30	1.13	31	1.07	28	1.13	28	1.00	24	1.00	26	1.13
33A	PC	23	1.21	24	1.19	24	1.21	23	1.21	25	1.04	24	1.00	25	1.15
56	CC	26	1.17	26	1.17	26	1.17	26	1.17	28	1.00	24	1.00	24	1.17
68B	CFBC+CT *	16	1.37	19	1.27	17	1.37	16	1.37	24	1.05	25	0.99	19	1.26
44	CFBC	15	1.40	17	1.30	18	1.36	17	1.36	25	1.04	26	0.98	19	1.26
40	CC	24	1.20	25	1.18	29	1.11	30	1.11	27	1.02	26	0.98	29	1.06
68A	CFBC *	18	1.34	24	1.19	19	1.35	17	1.36	22	1.08	28	0.98	21	1.21
4	CC	27	1.16	29	1.14	31	1.07	32	1.07	30	0.97	27	0.93	32	1.03
55	CC	23	1.21	23	1.20	27	1.14	27	1.15	30	0.97	28	0.92	27	1.08
12B	CC	25	1.18	25	1.18	26	1.17	25	1.18	29	0.99	28	0.92	28	1.07
54	CC	22	1.22	22	1.22	25	1.20	23	1.21	27	1.02	28	0.92	28	1.07
31B	CC	25	1.18	25	1.18	29	1.11	29	1.12	31	0.94	29	0.91	27	1.08
30B	CC	25	1.18	25	1.18	29	1.11	29	1.12	31	0.94	30	0.90	29	1.06
CT	CT	30	0.93	34	0.88	33	0.93	34	0.93	32	0.93	31	0.86	35	0.86
43	CFBC	25	1.18	32	1.04	26	1.17	25	1.18	33	0.92	32	0.85	28	1.07
31A	CC	25	1.18	25	1.18	30	1.10	31	1.10	34	0.86	33	0.83	30	1.05
30A	CC	25	1.18	25	1.18	30	1.10	31	1.10	34	0.86	34	0.82	31	1.04
38	PUMP.HYDRO**	32	0.91	33	0.91	34	0.91	35	0.91	36	0.79	35	0.79	34	0.92
WEST	CT*	31	0.92	33	0.91	32	0.99	33	0.99	35	0.80	36	0.78	33	0.97

TABLE 8

SORT_STA.WK1

5/26 Update EEAF Info ↓

TOP PLANS

	R2 (w/o EEAF) Resrc #	Ratio		R3 (w/EEAF) Resrc #	Ratio	
1.	MPC-DSM	2.37 - 2.83	1.	MPC-DSM	2.37 - 2.83	
2.	BDa(pk)	1.67	2.	BDa	1.60	1.59
3.	1(waste coal)	1.61	3.	6A	1.59	1.56
4.	BDb (firm)	1.60	4.	IXA & IXB	1.54	
5.	6a(surplus)	1.59	5.	BDb(Firm)	1.54	1.55
6.	IXA & IXB	1.54	6.	Ryan	1.53	1.50
7.	Ryan	1.53	7.	1	1.48	
8.	TFalls (A&D)	1.43	8.	TFalls (B&A)	1.43(1.42)	
9.	C	1.41	9.	C	1.38	
10.	B	1.39	10.	B	1.37	
11.	AEX	1.34	16.	AEX	1.34	
12.	35A (Coke)	1.28	11.	35A (Coke)	1.19	
13.	66A (N.Gas)	1.20	12.	66A (N.Gas)	1.16	
14.	65C (2CT)	1.19	13.	65C (2CT)	1.12	
15.	65B (1CT)	1.18	14.	66C	1.12	
*Plus #38 Pumped Hydro			15.	65B	1.11	
16.	66C	1.15	16.	28	1.10	
	65A	1.15				
17.	13	1.13	15.	65A	1.09	
	28	1.13		14	1.09	Top 21
18.	45	1.12	17.	66B	1.06	Resources
				13	1.06	
19.	66B	1.09	18.	45	1.04	
	14	1.09				
20.	68C	1.08	19.	33B	1.03	
	44	1.08				
21.	56	1.06	20.	68C	1.02	
				21	1.02	
			21.	A	1.00	
				33A	1.00	
				69	1.00	
				56	1.00	

*#28 & 56 do not have an EEAF computed.

TOP PLANS

SIZE, FUEL, LIFE

	Resource	MW	Fuel	Life
1.	MPC-DSM	116	DSM	20
- 2.	BDa	60	Steam/NG	15
3.	1	80	CC/Coal Gas	25
- 4.	BDb	60	Steam/NG & Hydro	30
x 5.	6A	98	Surplus PC	15
x 6.	IXA & IXB	50 & 76	Surplus	10
x 7.	Ryan	43	Hydro	46
x 8.	T.Falls (A&D)	14 & 41	Hydro	46
x 9.	C	38	Cogen-CT/NG	15
x 10.	B	15	Cogen/Steam	15
~ 11.	35A	68	CFBC/Coke	30
~ 12.	66A + CT	92 & 33	CC/NG	25
13.	65A + CT	161 & 33	PC/Coal	25
14.	38	100	Pumped Hydro	30
15.	28	129	CC/NG	20
~ 16.	14	5	Hydro RO	20

Eliminated Wind, Pure COGEN and Geothermal.

TECH10.WK1

THE MONTANA POWER COMPANY

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EEAF'S AS CALCULATED BY MPC

BASE YEAR 1991

	FUEL TYPE	CAPABILITY PEAK (MW)	CAPABILITY ENERGY (aMW)	BENEFIT/ COST RATIO	EEAF	DIST. FACT.	SCREEN RATIO
1	Coal	98.0	41.7	1.68	1.000	1.00	1.68
2	Electricty	50.0	12.3	1.66	1.000	1.00	1.66
3	Waste Coal	80.0	75.2	1.74	1.092	1.00	1.60
4	Water	47.9	0.9	1.53	1.000	1.00	1.53
5	Natural Gas	38.4	34.9	1.55	1.023	1.00	1.51
6	Steam	14.5	13.2	1.53	1.019	1.00	1.51
7	Coal & Natural Gas	194.0	151.8	1.54	1.075	1.00	1 43
8	Water	41.4	15.2 *	1.43	1.000	1.00	1 43
9	Coal & Natural Gas	227.0	162.8	1.54	1.075	1.00	1.43
10	Water	20.5	19.4 *	1.43	1.000	1.00	1.43
11	Coal	161.0	140.8	1.52	1.082	1.00	1.40
12	Water	37.9	15.0 *	1.37	1.000	1.00	1.37
13	Water	31.1	16.2 *	1.37	1.000	1.00	1.37
14	Natural Gas	60.0	13.1 *	1.37	1.029	1.00	1.33
15	Natural Gas	89.4	86.1	1.38	1.044	1.00	1.32
16	Petroleum Coke	68.4	59.7	1.41	1.065	1.00	1.32
17	Coal	124.5	115.8	1.43	1.090	1.00	1.31
18	Petroleum Coke	68.4	59.7	1.39	1.065	1.00	1.30
19	Waste Coal & N.G.	158.0	99.8	1.39	1.077	1.00	1.29
20	Natural Gas	158.0	108.2	1.33	1.044	1.00	1.27
21	Waste Coal & N.G.	125.0	88.8	1.37	1.083	1.00	1.26
22	Waste Coal	92.0	77.9	1.36	1.083	1.00	1.26
23	Natural Gas	125.0	97.3	1.30	1.044	1.00	1.25
24	Waste Coal	40.0	35.2	1.35	1.095	1.00	1.23
25	Coal	114.0	43.0	1.22	1.000	1.00	1.22
26	Natural Gas	88.0	76.5	1.20	1.000	1.00	1.20
27	Natural Gas	115.4	99.7	1.24	1.042	1.00	1.19
28	Waste Coal	40.0	35.2	1.33	1.125	1.00	1.18
29	Natural Gas	220.0	201.9	1.18	1.000	1.00	1.18
30	Hydro	5.2	5.0 *	1.17	0.999	1.00	1.18
31	Coal	114.0	85.9	1.17	1.000	1.00	1.17
32	Natural Gas	94.0	92.2	1.21	1.046	1.00	1.15
33	Natural Gas	128.9	123.7	1.18	1.027	1.00	1.15
34	DSM	2.0	0.8	1.07	1.000	1.06	1.13
35	Natural Gas	49.1	47.1	1.12	1.000	1.00	1.12
36	Natural Gas	150.0	139.6	1.10	1.000	1.00	1.10
37	Natural Gas	48.8	46.9	1.09	1.000	1.00	1.09
38	Natural Gas	48.9	46.9	1.08	1.000	1.00	1.08
39	Natural Gas	24.9	23.9	1.07	1.000	1.00	1.07
40	Natural Gas	41.6	39.2	1.12	1.054	1.00	1.06

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	FUEL TYPE	CAPABILITY PEAK (MW)	CAPABILITY ENERGY (aMW)	BENEFIT/ COST RATIO	EEAF	DIST. FACT.	SCREEN RATIO
41	Waste Coal	40.0	35.2	1.16	1.097	1.00	1.06
42	Natural Gas	156.0	132.7	1.11	1.043	1.00	1.06
43	Natural Gas	44.5	42.7	1.05	1.000	1.00	1.05
44	Natural Gas	156.0	132.7	1.09	1.043	1.00	1.05
45	Natural Gas	113.3	101.0	1.15	1.097	1.00	1.05
46	Waste Coal	40.0	35.2	1.16	1.104	1.00	1.05
47	Natural Gas	156.0	132.7	1.11	1.058	1.00	1.05
48	Natural Gas	113.5	102.8	1.12	1.069	1.00	1.04
49	Natural Gas	121.2	107.9	1.18	1.130	1.00	1.04
50	Natural Gas	140.0	119.0	1.09	1.047	1.00	1.04
51	DSM	3.0	1.4	0.98	1.000	1.06	1.04
52	Natural Gas	52.3	44.0	1.04	1.000	1.00	1.04
53	Natural Gas	156.0	132.7	1.09	1.058	1.00	1.03
54	Natural Gas	111.3	94.1	1.07	1.044	1.00	1.03
55	Natural Gas	60.0	3.6	1.07	1.047	1.00	1.02
56	Natural Gas	24.9	23.9	1.00	1.000	1.00	1.00
57	Natural Gas	24.9	23.9	1.00	1.000	1.00	1.00
58	Natural Gas	42.9	41.2	1.00	1.000	1.00	1.00
59	Natural Gas	24.9	23.9	0.99	1.000	1.00	0.99
60	Geothermal	20.0	12.5	0.98	1.000	1.00	0.98
61	Waste Coal & N.G.	112.0	62.2	1.05	1.079	1.00	0.98
62	Hydro	1.2	4.6 *	0.96	1.000	1.00	0.96
63	Natural Gas	24.9	23.9	0.96	1.000	1.00	0.96
64	Geothermal	22.0	18.2 *	0.96	1.000	1.00	0.96
65	Natural Gas	35.6	35.4	0.95	1.000	1.00	0.95
66	Natural Gas	220.0	201.9	0.93	1.000	1.00	0.93
67	Natural Gas	35.6	35.4	0.92	1.000	1.00	0.92
68	Hydro	100.0	38.1	0.91	0.999	1.00	0.91
69	Wind	20.4	10.7 *	0.91	1.000	1.00	0.91
70	Natural Gas	41.6	39.2	0.96	1.054	1.00	0.91
71	Wind	51.8	23.6 *	0.91	1.000	1.00	0.91
72	Wind	20.8	9.4 *	0.91	1.000	1.00	0.91
73	Wind	44.8	24.8 *	0.91	1.000	1.00	0.91
74	Wind	17.8	9.9 *	0.91	1.000	1.00	0.91
75	Waste Coal & N.G.	79.0	51.3	0.97	1.081	1.00	0.90
76	Geothermal	20.0	12.5	0.90	1.000	1.00	0.90
77	Wind	20.4	10.7 *	0.89	1.000	1.00	0.89
78	Waste Coal	46.0	40.3	0.97	1.091	1.00	0.89
79	Natural Gas	107.9	92.8	0.88	1.000	1.00	0.88
80	Natural Gas	57.6	53.6	0.86	1.000	1.00	0.86
81	Natural Gas	42.0	3.2	0.93	1.081	1.00	0.86
82	System	100.0	30.0	0.84	1.000	1.00	0.84

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THE MONTANA POWER COMPANY

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EEAF'S AS CALCULATED BY MPC

BASE YEAR 1991

	FUEL TYPE	CAPABILITY PEAK (MW)	CAPABILITY ENERGY (aMW)	BENEFIT/ COST RATIO	EEAF	DIST. FACT.	SCREEN RATIO
83	Natural Gas	38.4	33.5	0.81	1.081	1.00	0.81
84	Natural Gas	48.0	47.2	0.81	1.000	1.00	0.81
85	Natural Gas	107.9	70.3	0.81	1.000	1.00	0.81
86	Hydro	0.1	0.8 *	0.81	1.000	1.00	0.81
87	Hydro	54.9	33.2 *	0.75	1.000	1.00	0.75
88	Wind	4.3	3.9 *	0.73	1.000	1.00	0.73
89	Hydro	250.0	103.1	0.73	1.000	1.00	0.73
90	Natrual Gas	8.8	5.7	0.70	1.000	1.00	0.70
91	Wind	12.7	11.5 *	0.69	1.000	1.00	0.69
92	Wind	6.9	3.8 *	0.68	1.000	1.00	0.68
93	Wind	20.1	11.1 *	0.65	1.000	1.00	0.65
94	Coal	108.0	44.1	0.62	1.000	1.00	0.62
95	Wind	8.6	3.4 *	0.60	1.000	1.00	0.60
96	Wind	4.8	2.4 *	0.58	1.000	1.00	0.58
97	Wind	10.1	3.1 *	0.56	1.000	1.00	0.56
98	Wind	10.1	3.1 *	0.56	1.000	1.00	0.56
99	Hydro	0.0	1.4 *	0.46	1.000	1.00	0.46
100	Wind	20.4	10.7 *		1.000	1.00	0.00
101	Wind	4.8	2.4		1.000	1.00	0.00

* Energy shown is firm energy. Nonfirm energy is available.

RUN5 DEE/EEAF CASE CONSERVATION 26-MAY-1992 02:29:37 PM PROSCREEN>R92.UFO>RFP.UFO>GRRUN5/6.W20

	Preview	2006 TPVRR	KEY COLUMN 2030 TPVRR	Ryan8rdfTfpk8rdpGeneSeex28-rRslo65ar66ar35ar-Crf06ar38rf64-rDS	M	% ABOVE PREV	% ABOVE LOWEST
✓	AAAA 2	1586474	1 2420417 –	[1] 0 [1] [1] [1] [1] 0 [1] 0 0 0 [1] [1] 0 0		0.05%	0.14%
✓	AAAA 4	1589313	2421544 –	0 0 1 1 1 1 0 1 0 0 0 1 1 0 [1]		0.05%	0.14%
✓	AAAA 6	1598739	2429595	1 0 1 0 1 1 0 1 0 0 0 1 1 0 1		0.33%	0.48%
✓	AAAA 18	1600148	2431313	0 0 1 1 1 0 0 1 0 0 0 1 1 0 2		0.07%	0.55%
	AAAA 10	1596798	6 2431851	1 0 1 1 1 0 0 1 0 0 0 1 1 0 1		0.02%	0.57%
	AAAA 15	1603887	2434303	0 0 1 0 1 1 0 1 0 0 0 1 1 0 2		0.10%	0.67%
	AAAA 9	1594682	2435873	0 0 0 1 1 1 0 1 0 0 0 1 1 0 2		0.06%	0.74%
	AAAA 11	1605097	2437437 –	0 [1] 1 0 1 1 0 1 0 0 0 0 1 0 2		0.06%	0.80%
	AAAA 16	1599252	2439080	1 0 0 1 1 0 0 1 0 0 0 1 1 0 2		0.07%	0.87%
	AAAA 7	1607186	10 2441886	1 1 1 0 1 1 0 1 0 0 0 0 1 0 1		0.12%	0.99%
	AAAA 12	1603168	2442584	1 0 0 0 1 1 0 1 0 0 0 1 1 0 2		0.03%	1.02%
✓	SASA 1	1589629	2442729 –	1 0 1 1 1 1 0 1 0 0 0 1 1 0 0		0.01%	1.02%
	AAAA 1	1616203	2442862	1 1 1 0 1 1 0 1 0 0 0 1 0 0 2		0.01%	1.03%
	AAAA 3	1620603	2449150 –	1 0 1 1 1 1 0 1 0 [1] 0 0 0 0 1		0.26%	1.29%
	AAAA 17	1610251	15 2452197	1 0 0 1 1 0 0 1 0 1 0 0 1 0 0		0.12%	1.41%
	AAAA 13	1611925	2452671	1 1 0 0 1 1 0 1 0 0 0 0 1 0 2		0.02%	1.43%
	AAAA 19	1613335	2453123 –	1 0 1 0 1 1 0 1 0 0 [1] 0 1 0 0		0.02%	1.45%
✓	SASA 2	1594570	2453260	1 1 0 0 1 1 0 1 0 0 0 1 1 0 1		0.01%	1.46%
	AAAA 28	1620750	2455322	1 1 1 0 1 0 0 1 0 0 0 0 1 0 2		0.08%	1.54%
	AAAA 26	1610531	20 2455630	1 0 0 0 1 1 0 1 0 0 1 0 1 0 1		0.01%	1.55%
	AAAA 5	1622112	2455652	1 0 0 1 1 1 0 1 0 1 0 0 0 0 2		0.00%	1.56%
	AAAA 8	1631196	2456599	0 0 1 1 1 1 0 1 0 1 0 0 0 0 2		0.04%	1.59%
	AAAA 38	1613917	2457552	0 0 0 0 1 1 0 1 0 0 1 0 1 0 2		0.04%	1.63%
	AAAA 35	1620918	2462646	1 1 0 0 1 0 0 1 0 0 0 1 1 0 2		0.21%	1.84%
✓	SASA 3	1603208	25 2464798	0 1 0 0 1 1 0 1 0 0 0 1 1 0 2		0.09%	1.93%
✓	SASA 8	1617465	2466623	1 0 1 0 1 1 0 1 0 0 0 1 1 0 2		0.07%	2.01%
	SASA 4	1608267	2470246	1 0 0 1 1 1 0 1 0 1 0 0 1 0 0		0.15%	2.16%
	AAAA 20	1643560	2470978	1 0 1 1 1 0 0 1 0 1 0 0 0 0 2		0.03%	2.19%
	AAAA 23	1636422	2472006	1 0 0 1 1 0 0 1 0 1 0 1 0 0 2		0.04%	2.23%
	AAAA 30	1639694	30 2473147	1 0 1 0 1 1 0 1 0 0 1 1 0 0 2		0.05%	2.28%
	SASA 6	1614182	2475059	0 0 0 1 1 1 0 1 0 1 0 0 1 0 1		0.08%	2.36%
	SASA 10	1628194	2482477	1 0 1 1 1 0 0 1 0 1 0 0 1 0 0		0.30%	2.66%
	AAAA 56	1644460	2482782	1 0 1 0 1 0 0 1 0 0 0 1 0 1 2		0.01%	2.68%
	SASA 11	1621923	2483248	1 0 0 1 1 0 0 1 0 1 0 0 1 0 1		0.02%	2.70%
	SASA 19	1624365	35 2483843	0 0 0 1 1 0 0 1 0 1 0 0 1 0 2		0.02%	2.72%
	SASA 15	1624908	2484885	1 0 1 0 1 1 0 1 0 0 1 0 1 0 1		0.04%	2.76%
	AAAA 27	1613244	2486057 –	0 1 0 0 1 0 0 1 0 0 0 1 1 [1] 0		0.05%	2.81%
	SASA 27	1632817	2488207	0 0 1 0 1 1 0 1 0 0 1 0 1 0 2		0.09%	2.90%
	SASA 23	1626098	2490440	1 0 0 0 1 1 0 1 0 0 1 0 1 0 2		0.09%	2.99%
	AAAA 52	1648798	40 2491091	1 0 0 0 1 0 0 1 0 1 0 0 1 0 2		0.03%	3.02%
	SASA 25	1639625	2494482	1 1 1 0 1 0 0 1 0 0 0 1 1 0 2		0.14%	3.16%
	AAAA 14	1640535	2498479	0 1 1 0 1 1 0 1 0 0 0 1 0 1 1		0.16%	3.33%
	AAAA 39	1629696	2501994	0 1 0 0 1 0 0 1 0 0 0 0 1 1 1		0.14%	3.47%
	AAAA 22	1637105	2504157	0 0 0 1 0 0 1 0 1 0 1 0 1 0 0		0.09%	3.56%
	AAAA 29	1639510	45 2505522	0 0 1 0 0 1 0 0 1 1 0 1 0 0		0.05%	3.62%
	AAAA 49	1642684	2506236	0 0 1 0 1 0 0 1 1 1 1 1 1 1 1		0.03%	3.65%
	AAAA 25	1648625	2507610	1 1 1 0 1 0 0 1 0 0 0 1 0 1 1		0.05%	3.70%
	AAAA 37	1651313	2508731	0 1 1 0 1 0 0 1 0 0 0 1 0 1 2		0.04%	3.75%
	AAAA 33	1638506	2509220	0 0 0 0 1 1 0 1 0 0 1 1 0 1 1		0.02%	3.77%
	AAAA 60	1652587	50 2510536 –	1 0 0 1 1 0 [1] 1 0 0 0 0 0 0 2		0.05%	3.83%
	AAAA 24	1638589	2511901	1 0 0 0 1 1 0 1 0 0 1 1 0 1 0		0.05%	3.88%
	SASA 22	1661930	2512146	1 0 1 1 1 0 0 1 0 1 0 1 0 0 2		0.01%	3.89%
	AAAA 31	1654650	2512366	0 0 1 1 1 0 0 1 0 1 0 0 0 1 0		0.01%	3.90%
	AAAA 45	1637562	2513781	0 0 0 0 1 1 0 1 0 0 1 0 1 1 0		0.06%	3.96%
	AAAA 57	1636534	55 2514249	0 0 0 0 1 0 0 1 0 0 1 1 1 1 0		0.02%	3.98%
	AAAA 48	1642207	2514330	0 0 0 0 1 0 0 1 0 1 0 0 1 1 0		0.00%	3.98%
	AAAA 21	1647256	2514358	1 0 0 1 1 0 0 1 0 1 0 0 0 1 0		0.00%	3.98%

RUN5 DEE/EEAF CASE CONSERVATION 26-MAY-1992 02:29:37 PM PROSCREEN>R92.UFD>RFP.UFD>GRRUN5/6.W20

Preview

	N	2006 IPVRR	KEY COLUMN 2030 IPVRR	RyanBrdfTfpkBrdpGeneSeex28-rRslo65ar66ar35ar-Crf06ar38rf64-rDS	M	% ABOVE	% ABOVE
SASA	18	1633888	2516393	0 1 1 0 1 0 0 1 0 0 1 1 1 0		0.08%	4.07%
AAAA	34	1651416	2517878	1 0 0 0 1 1 0 1 0 1 0 1 0 1 0		0.06%	4.13%
AAAA	59	1649978	60 2519330	0 0 1 0 1 0 0 1 0 0 1 0 1 1 0		0.06%	4.19%
AAAA	40	1663157	2519476	0 0 1 0 1 1 0 1 0 1 0 0 0 1 1		0.01%	4.19%
SASA	44	1666227	2521357	1 0 1 0 1 0 0 1 0 1 0 0 1 0 2		0.07%	4.27%
AAAA	36	1663118	2521919	1 0 1 0 1 1 0 1 0 1 0 0 0 1 0		0.02%	4.30%
AAAA	32	1654474	2522530	1 1 0 0 1 0 0 1 0 1 0 0 0 1 0		0.02%	4.32%
AAAA	42	1656264	65 2522706	0 0 0 0 1 1 0 1 0 1 0 1 0 1 1		0.01%	4.33%
SASA	17	1631425	2522915	1 1 0 0 1 0 0 1 0 0 0 1 1 1 0		0.01%	4.34%
SASA	5	1647122	2525948	0 1 1 0 1 1 0 1 0 0 0 1 0 1 1		0.12%	4.46%
AAAA	55	1648870	2526753	1 0 0 0 1 0 0 1 0 0 1 0 1 1 0		0.03%	4.50%
AAAA	44	1668466	2526920	1 0 1 0 1 0 0 1 0 1 0 1 0 1 0		0.01%	4.50%
AAAA	64	1651483	70 2528886	0 0 0 0 1 0 0 1 0 0 1 0 1 1 1		0.08%	4.58%
AAAA	41	1662746	2530346	0 1 0 0 1 0 0 1 0 1 0 0 0 1 1		0.06%	4.64%
SASA	7	1654907	2531369	0 0 1 1 1 1 0 1 0 1 0 0 0 1 0		0.04%	4.69%
AAAA	50	1673167	2532214	0 0 1 0 1 0 0 1 0 1 0 1 0 1 1		0.03%	4.72%
SASA	29	1637644	2532260	0 1 0 0 1 0 0 1 0 0 0 1 1 1 1		0.00%	4.72%
AAAA	51	1645369	75 2532349	0 0 0 1 1 0 1 1 0 0 0 0 0 1 0		0.00%	4.73%
SASA	30	1649652	2533012	0 1 1 0 1 0 0 1 0 0 0 0 1 1 1		0.03%	4.75%
AAAA	47	1667673	2534510	1 0 0 0 1 0 0 1 0 1 0 1 0 1 1		0.06%	4.82%
SASA	16	1656604	2535216	0 0 1 1 1 0 0 1 0 1 0 1 0 1 0		0.03%	4.85%
AAAA	53	1670562	2536188	0 0 0 0 1 0 0 1 0 1 0 1 0 1 2		0.04%	4.89%
AAAA	63	1672604	80 2536538	0 0 1 0 1 0 0 1 0 0 1 1 0 1 2		0.01%	4.90%
AAAA	46	1678912	2537135	1 0 1 0 1 0 0 1 0 1 0 0 0 1 1		0.02%	4.93%
AAAA	58	1672741	2539486	1 0 1 0 1 0 0 1 0 0 1 1 0 1 1		0.09%	5.02%
SASA	50	1669614	2540102	1 0 1 1 1 0 1 1 0 0 0 0 0 0 2		0.02%	5.05%
AAAA	54	1683422	2540642	0 0 1 0 1 0 0 1 0 1 0 0 0 1 2		0.02%	5.07%
SASA	14	1654266	85 2541691	1 0 0 1 1 0 0 1 0 1 0 1 0 1 0		0.04%	5.11%
SASA	9	1654694	2541856	1 0 0 0 1 1 0 1 0 1 0 1 0 1 0		0.01%	5.12%
SASA	26	1660578	2542097	0 0 1 0 1 1 0 1 0 0 1 1 0 1 1		0.01%	5.13%
AAAA	43	1667054	2542277—	1 0 0 0 1 0 0 1 [1] 0 0 0 0 1 0		0.01%	5.14%
SASA	39	1660419	2543044	0 0 1 0 1 0 0 1 0 1 0 0 1 1 0		0.03%	5.17%
SASA	49	1654013	90 2543549	0 0 1 0 1 0 0 1 0 0 1 1 1 1 0		0.02%	5.19%
SASA	13	1659196	2546001	0 1 0 0 1 1 0 1 0 1 0 0 0 1 1		0.10%	5.29%
SASA	24	1659120	2546227	0 0 0 1 1 0 0 1 0 1 0 1 0 1 1		0.01%	5.30%
SASA	20	1662181	2546320	1 0 1 0 1 1 0 1 0 0 1 1 0 1 0		0.00%	5.31%
AAAA	62	1660181	2546327	1 0 0 0 1 1 1 1 0 0 0 0 0 1 0		0.00%	5.31%
SASA	41	1655938	95 2547463	0 0 0 0 1 0 0 1 0 1 0 1 1 1 0		0.04%	5.35%
SASA	36	1658232	2549820	1 0 0 0 1 0 0 1 0 1 0 0 1 1 0		0.09%	5.45%
AAAA	66	1664763	2550863	0 0 0 0 1 1 1 1 0 0 0 0 0 1 1		0.04%	5.49%
SASA	12	1654619	2551130	0 0 0 1 1 0 0 1 1 0 0 0 0 1 0		0.01%	5.50%
SASA	21	1672949	2552355	1 1 1 0 1 0 0 1 0 1 0 0 0 1 0		0.05%	5.55%
AAAA	67	1676296	100 2554202	1 0 1 0 1 0 1 1 0 0 0 0 0 1 0		0.07%	5.63%
SASA	47	1663424	2554483	0 0 0 0 1 0 0 1 0 1 0 0 1 1 1		0.01%	5.64%
SASA	46	1662751	2554904	1 0 1 0 1 0 0 1 0 0 1 0 1 1 0		0.02%	5.66%
SASA	34	1651990	2557693	0 0 0 1 1 1 1 0 0 0 0 0 0 1 0		0.11%	5.78%
SASA	31	1679467	2559505	0 1 1 0 0 0 1 0 1 0 0 0 0 1 1		0.07%	5.85%
AAAA	65	1683701	105 2559585	1 0 0 0 0 1 0 1 0 0 1 1 0 1 2		0.00%	5.85%
AAAA	61	1690945	2560343	1 0 0 0 0 0 1 0 1 0 1 0 0 1 2		0.03%	5.89%
SASA	54	1671560	2560530	0 0 1 0 1 0 0 1 0 0 1 0 1 1 1		0.01%	5.89%
SASA	43	1663718	2560653	0 0 1 1 1 0 0 1 1 0 0 0 0 1 0		0.00%	5.90%
SASA	28	1672706	2560825	1 1 0 0 1 0 0 1 0 1 0 0 0 1 1		0.01%	5.90%
AAAA	69	1682838	110 2561497	0 0 1 0 1 0 1 1 0 0 0 0 0 1 1		0.03%	5.93%
SASA	32	1675776	2562900	0 1 0 0 1 0 0 1 0 1 0 0 0 1 2		0.05%	5.99%
AAAA	68	1676007	2563168	1 0 0 0 1 0 1 1 0 0 0 0 0 1 1		0.01%	6.00%
AAAA	70	1678766	2564741	0 0 0 0 1 0 1 1 0 0 0 0 0 1 2		0.06%	6.07%
SASA	38	1684391	2565930	1 0 1 0 1 0 0 1 0 1 0 1 0 1 1		0.05%	6.12%

DEE/EEAF

RUN5 DEE/EEAF CASE CONSERVATION 26-MAY-1992 02:29:37 PM PROSCREEN>R92.UFD>RFP.UFD>GRRUN5/6.W20

	Preview N=	2006 IPVRR	KEY COLUMN 2030 IPVRR	RyanBrdfIfpkBrdpGeneSeex28-rRslo65ar66ar35ar-Crf06ar38rf64-rDS	M	% ABOVE	X ABOVE
SASA	48	1688635	2567084	0 0 1 0 1 0 0 1 0 1 0 1 0 1 2		0.04%	6.16%
SASA	37	1661962	2567602	1 0 0 0 1 1 1 1 0 0 0 0 0 1 0		0.02%	6.19%
SASA	40	1661891	2567935	1 0 0 1 1 0 1 1 0 0 0 0 0 1 0		0.01%	6.20%
SASA	33	1685478	2572472	1 0 1 0 1 0 0 1 1 0 0 0 0 1 0		0.18%	6.39%
SASA	52	1666258	2572971	0 0 0 1 1 0 1 1 0 0 0 0 0 1 1		0.02%	6.41%
SASA	35	1685211	2581767	1 0 0 0 1 0 0 1 1 0 0 0 0 1 1		0.34%	6.77%
SASA	45	1688032	2583719	0 0 0 0 1 0 0 1 1 0 0 0 0 1 2		0.08%	6.85%
SASA	42	1697130	2584526	0 0 1 0 1 0 0 1 1 0 0 0 0 1 1		0.03%	6.89%
SASA	51	1696463	2585167	1 0 0 0 1 0 0 1 0 1 0 1 0 1 2		0.02%	6.91%
SASA	53	1695250	2588596	1 0 0 0 1 0 0 1 0 1 1 0 0 1 1		0.13%	7.05%
SASA	56	1691421	2591788	1 0 1 0 1 0 1 1 0 0 0 0 0 1 1		0.12%	7.19%
SASA	58	1695558	2593092	0 0 1 0 1 0 1 1 0 0 0 0 0 1 2		0.05%	7.24%
SASA	55	1704241	2597497	0 0 0 0 1 0 0 1 0 1 1 0 0 1 2		0.17%	7.42%
SASA	57	1693489	2600149	1 0 0 0 1 0 1 1 0 0 0 0 0 1 2		0.10%	7.53%

Dynamic Analysis Step 2 Resource Plans

Nbr run	TPV Ttl Soc.Cost '91-'00	TPV Ttl Soc.Cost '91-'30	Ryan 43 MW	Bird Firm'ng 60 MW	Thom'sn Falls 41 MW	Bird Peaking 60 MW	IPCo Exch'ng 50 MW	IPCo Exch'ng 76 MW	Tiber Hydro 5 MW	DSM	Westmn'nd CC 92 MW	Stone #B 15 MW	LS Pwr 68 MW	Stone #C 38 MW	Basin Antelope 98 MW	Pump Hydro 100 MW	Comb'n Turb'n 33 MW
1	1.0564	2.4414	0	0	0	1	1	0	0	1	0	1	0	1	1	0	0
2	1.0568	2.4432	0	0	0	1	1	0	1	1	0	1	0	1	1	0	0
3	1.0588	2.4504	0	0	0	1	1	0	0	1	0	1	0	1	1	0	1
2 IEX+	1.0600	2.4524	0	1	0	0	0	1	0	1	0	0	0	1	1	0	0
5	1.0592	2.4527	0	0	0	1	1	0	1	1	0	1	0	1	1	0	1
7 IEX+	1.0701	2.4530	0	0	1	0	0	1	0	1	0	1	0	1	1	0	0
9 IEX+	1.0705	2.4543	0	0	1	0	0	1	1	1	0	1	0	1	1	0	0
5 IEX+	1.0612	2.4547	0	1	0	0	0	1	0	1	0	1	0	1	1	0	0
1 IEX+	1.0657	2.4552	1	0	0	0	0	1	0	1	0	1	0	1	1	0	0
4	1.0607	2.4553	0	0	1	1	1	0	0	1	0	1	0	1	1	0	0
8 IEX+	1.0615	2.4561	0	1	0	0	0	1	1	1	0	0	0	1	1	0	0
6	1.0612	2.4565	0	0	1	1	1	0	1	1	0	1	0	1	1	0	0
24 IEX+	1.0718	2.4568	0	0	1	1	0	1	0	1	0	0	0	1	1	0	0
26	1.0721	2.4569	0	0	1	1	1	0	0	1	0	0	0	1	1	0	0
27	1.0724	2.4580	0	0	1	1	1	0	1	1	0	0	0	1	1	0	0
14 IEX+	1.0665	2.4580	0	0	0	0	0	1	0	1	0	1	0	1	1	0	1
3 IEX+	1.0660	2.4580	1	0	0	0	0	1	1	1	0	1	0	1	1	0	0
27 IEX+	1.0722	2.4581	0	0	1	1	0	1	1	1	0	0	0	1	1	0	0
13 IEX+	1.0706	2.4587	0	0	1	1	0	1	0	1	0	1	0	1	1	0	0
7	1.0618	2.4587	1	0	0	1	1	0	0	1	0	1	0	1	1	0	0
28	1.0702	2.4599	0	1	1	0	1	0	0	1	0	1	0	0	1	0	0
17 IEX+	1.0669	2.4600	0	0	0	0	0	1	1	1	0	1	0	1	1	0	1
16 IEX+	1.0710	2.4602	0	0	1	1	0	1	1	1	0	1	0	1	1	0	0
13	1.0653	2.4605	1	0	0	1	0	0	0	1	0	1	0	1	1	0	0
22	1.0703	2.4607	0	0	1	1	0	0	1	1	0	1	0	1	1	0	0
4 IEX+	1.0663	2.4610	1	0	0	1	0	1	0	1	0	1	0	1	1	0	0
20	1.0658	2.4613	1	1	0	0	1	0	0	1	0	1	0	0	1	0	0
8	1.0621	2.4615	1	0	0	1	1	0	1	1	0	1	0	1	1	0	0
18 IEX+	1.0723	2.4620	0	0	1	0	0	1	0	1	0	1	0	1	1	0	1
25	1.0669	2.4623	0	0	0	1	0	0	1	1	0	1	0	1	1	0	1

TABLE 12
Dynamic Analysis Step 2 Resource Plans

Nbr run	TPV Ttl Soc.Cost '91-'00	'91-'30	Ryan 43 MW	Bird Firm'ng 60 MW	Thom'sn Falls 41 MW	Bird Peaking 60 MW	IPCo Exch'ng 50 MW	IPCo Exch'ng 76 MW	Tiber Hydro 5 MW	DSM	Westm'nd CC 92 MW	Stone #B 15 MW	LS Pwr 68 MW	Stone #C 38 MW	Basin Antelope 98 MW	Pump Hydro 100 MW	Comb'n Turb'n 33 MW
29 IEX+	1.0686	2.4623	0	0	0	1	0	1	0	1	0	0	0	1	1	0	1
29	1.0706	2.4624	0	1	1	0	1	0	1	1	0	1	0	0	1	0	0
31 IEX+	1.0705	2.4633	0	0	0	0	0	1	0	1	0	1	1	0	1	0	0
16	1.0656	2.4634	1	0	0	1	0	0	1	1	0	1	0	1	1	0	0
9	1.0631	2.4638	0	0	1	1	1	0	0	1	0	1	0	1	1	0	1
6 IEX+	1.0667	2.4638	1	0	0	1	0	1	1	1	0	1	0	1	1	0	0
19 IEX+	1.0671	2.4638	0	0	0	1	0	1	0	1	0	1	0	1	1	0	1
24	1.0662	2.4639	1	1	0	0	1	0	1	1	0	1	0	0	1	0	0
10 IEX+	1.0680	2.4639	1	0	0	0	0	1	0	1	0	1	0	1	1	0	1
15	1.0640	2.4644	0	0	0	1	1	0	0	1	0	1	0	1	1	0	2
20 IEX+	1.0726	2.4645	0	0	1	0	0	1	1	1	0	1	0	1	1	0	1
30 IEX+	1.0690	2.4647	0	0	0	1	0	1	1	1	0	0	0	1	1	0	1
83 IEX+	1.0761	2.4655	0	0	0	1	0	1	0	1	1	0	0	1	0	0	0
39	1.0743	2.4655	0	0	1	1	1	0	0	1	0	0	0	1	1	0	1
35 IEX+	1.0676	2.4657	0	1	0	0	0	1	0	1	0	0	0	0	1	0	1
40	1.0677	2.4659	0	1	0	0	1	0	0	1	0	1	0	0	1	0	1
22 IEX+	1.0674	2.4660	0	0	0	1	0	1	1	1	0	1	0	1	1	0	1
32 IEX+	1.0707	2.4660	0	0	0	0	0	1	1	1	0	1	1	0	1	0	0
102	1.0771	2.4663	0	0	0	1	1	0	0	1	1	1	0	1	0	0	0
34 IEX+	1.0713	2.4665	0	0	0	0	0	1	0	1	0	0	1	1	1	0	0
37 IEX+	1.0677	2.4666	0	1	0	0	0	1	0	1	0	1	0	0	1	0	1
10	1.0635	2.4666	0	0	1	1	1	0	1	1	0	1	0	1	1	0	1
11 IEX+	1.0682	2.4666	1	0	0	0	0	1	1	1	0	1	0	1	1	0	1
17	1.0644	2.4670	0	0	0	1	1	0	1	1	0	1	0	1	1	0	2
11	1.0641	2.4672	1	0	0	1	1	0	0	1	0	1	0	1	1	0	1
45	1.0722	2.4673	0	0	0	0	1	0	0	1	0	0	1	1	1	0	0
26 IEX+	1.0689	2.4676	0	0	0	0	0	1	0	1	0	1	0	1	1	0	2
1 IEX+	1.0773	2.4679	0	0	0	1	0	1	0	1	1	1	0	1	0	0	0
38 IEX+	1.0680	2.4681	0	1	0	0	0	1	1	1	0	0	0	0	1	0	1
41	1.0747	2.4682	0	0	1	1	1	0	1	1	0	0	0	1	1	0	1

Dynamic Analysis Step 2 Resource Plans

Nbr run	TPV Ttl Soc.Cost '91-'00	TPV Ttl Soc.Cost '91-'30	Ryan 43 MW	Bird Firm'ng 60 MW	Thom'sn Falls 41 MW	Bird Peaking 60 MW	IPCo Exch'ng 50 MW	IPCo Exch'ng 76 MW	Tiber Hydro 5 MW	DSM	Westm'nd CC 92 MW	Stone #B 15 MW	LS Pwr 68 MW	Stone #C 38 MW	Basin Antelope 98 MW	Pump Hydro 100 MW	Comb'n Turb'n 33 MW
43	1.0681	2.4684	0	1	0	0	1	0	1	1	0	1	0	0	1	0	1
21 IEX+	1.0651	2.4685	1	1	0	0	0	1	0	1	0	0	0	1	1	0	0
39 IEX+	1.0681	2.4691	0	1	0	0	0	1	1	1	0	1	0	0	1	0	1
96 IEX+	1.0776	2.4692	0	0	0	1	0	1	1	1	1	0	0	1	0	0	0
52 IEX+	1.0749	2.4693	0	1	1	0	0	1	0	1	0	0	0	1	1	0	0
18	1.0675	2.4695	1	0	0	1	0	0	0	1	0	1	0	1	1	0	1
75 IEX+	1.0802	2.4698	0	0	1	1	0	1	0	1	0	1	0	0	1	0	1
40 IEX+	1.0685	2.4702	0	1	0	0	0	1	0	1	0	0	0	1	1	0	1
28 IEX+	1.0692	2.4702	0	0	0	0	0	1	1	1	0	1	0	1	1	0	2
48	1.0708	2.4705	1	1	0	0	1	0	0	1	0	0	0	1	1	0	0
42	1.0726	2.4710	0	1	1	0	1	0	0	1	0	1	0	0	1	0	1
12 IEX+	1.0704	2.4713	1	0	1	0	0	1	0	1	0	1	0	1	1	0	0
32	1.0726	2.4715	0	0	1	1	0	0	1	1	0	1	0	1	1	0	1
99 IEX+	1.0802	2.4715	0	1	1	0	0	1	0	1	0	1	0	1	0	0	1
44 IEX+	1.0800	2.4719	1	0	1	0	0	1	0	1	0	0	0	1	1	0	0
31	1.0682	2.4722	1	1	0	0	1	0	0	1	0	1	0	0	1	0	1
73	1.0805	2.4724	0	0	1	0	1	0	0	1	0	0	0	1	1	0	1
66 IEX+	1.0759	2.4724	0	0	0	0	0	1	0	1	1	0	0	0	1	0	0
21	1.0679	2.4725	1	0	0	1	0	0	1	1	0	1	0	1	1	0	1
79 IEX+	1.0806	2.4726	0	0	1	1	0	1	1	1	0	1	0	0	1	0	1
56	1.0805	2.4727	1	0	1	0	1	0	0	1	0	0	0	1	1	0	0
81 IEX+	1.0757	2.4729	1	1	0	0	0	1	0	1	0	1	0	1	0	0	1
64 IEX+	1.0806	2.4729	0	0	1	0	0	1	0	1	0	0	0	1	1	0	1
52	1.0712	2.4730	1	1	0	0	1	0	1	1	0	0	0	1	1	0	0
38	1.0686	2.4730	1	1	0	0	0	0	0	1	0	1	0	1	1	0	0
37	1.0692	2.4731	0	0	0	1	0	0	1	1	0	1	0	1	1	0	2
75	1.0807	2.4731	0	0	1	0	1	0	0	1	0	1	0	1	1	0	1
47 IEX+	1.0717	2.4731	1	1	0	0	0	1	0	1	0	1	0	1	1	0	0
133 IEX+	1.0861	2.4732	0	0	1	1	0	1	0	1	1	0	0	0	0	0	0
74 IEX+	1.0802	2.4735	0	0	1	1	0	1	0	1	0	0	0	1	1	0	1

Dynamic Analysis Step 2 Resource Plans

Nbr run	TPV Ttl Soc.Cost '91-'00	'91-'30	Ryan 43 MW	Bird Firm'ng 60 MW	Thom'sn Falls 41 MW	Bird Peaking 60 MW	IPCo Exch'ng 50 MW	IPCo Exch'ng 76 MW	Tiber Hydro 5 MW	DSM	Westm'nd CC 92 MW	Stone #B 15 MW	LS Pwr 68 MW	Stone #C 38 MW	Basin Antelope 98 MW	Pump Hydro 100 MW	Comb'n Turb'n 33 MW
46	1.0730	2.4737	0	1	1	0	1	0	1	1	0	1	0	0	1	0	1
15 IEX+	1.0707	2.4737	1	0	1	0	0	1	1	1	0	1	0	1	1	0	0
36 IEX+	1.0693	2.4738	1	1	0	0	0	1	1	1	0	0	0	1	1	0	0
136 IEX+	1.0863	2.4739	0	0	1	1	0	1	0	1	1	1	0	0	0	0	0
90	1.0808	2.4739	0	0	1	1	0	0	0	1	0	0	0	1	1	0	1
46 IEX+	1.0804	2.4740	1	0	1	0	0	1	1	1	0	0	0	1	1	0	0
51	1.0798	2.4740	1	0	1	0	1	0	0	1	0	1	0	1	1	0	0
100 IEX+	1.0806	2.4742	0	1	1	0	0	1	1	1	0	1	0	1	0	0	1
42 IEX+	1.0727	2.4742	0	0	0	0	0	1	0	1	0	1	1	0	1	0	1
72 IEX+	1.0768	2.4744	0	0	0	0	0	1	0	1	1	1	0	0	1	0	0
51 IEX+	1.0760	2.4744	1	0	0	0	0	1	0	1	0	0	0	1	1	0	1
12	1.0663	2.4745	1	0	1	1	1	0	0	1	0	1	0	1	1	0	0
58	1.0808	2.4746	1	0	1	0	1	0	1	1	0	0	0	1	1	0	0
35	1.0686	2.4749	1	1	0	0	1	0	1	1	0	1	0	0	1	0	1
80	1.0809	2.4750	0	0	1	0	1	0	1	1	0	0	0	1	1	0	1
65	1.0773	2.4752	0	0	1	1	0	0	0	1	0	1	0	1	1	0	1
60	1.0763	2.4753	1	0	0	0	1	0	0	1	0	1	0	1	1	0	1
67 IEX+	1.0809	2.4754	0	0	1	0	0	1	1	1	0	0	0	1	1	0	1
138 IEX+	1.0864	2.4754	0	0	1	1	0	1	1	1	1	0	0	0	0	0	0
55	1.0777	2.4757	1	0	1	1	1	0	0	1	0	0	0	1	1	0	0
86 IEX+	1.0760	2.4757	1	1	0	0	0	1	1	1	0	1	0	1	0	0	1
19	1.0696	2.4757	1	0	1	1	0	0	0	1	0	1	0	1	1	0	0
113 IEX+	1.0817	2.4758	1	0	0	1	0	1	0	1	1	0	0	0	0	0	0
83	1.0811	2.4759	0	0	1	0	1	0	1	1	0	1	0	1	1	0	1
77	1.0722	2.4760	0	1	0	0	1	0	0	1	0	0	0	1	1	0	1
115 IEX+	1.0819	2.4761	1	0	0	1	0	1	0	1	1	1	0	0	0	0	0
78 IEX+	1.0773	2.4761	0	0	0	0	0	1	1	1	1	0	0	0	1	0	0
48 IEX+	1.0699	2.4762	0	1	0	0	0	1	0	1	0	0	0	0	1	0	2
41 IEX+	1.0774	2.4762	0	0	1	0	0	1	0	1	0	1	0	1	1	0	2
54	1.0801	2.4762	1	0	1	0	1	0	1	1	0	1	0	1	1	0	0

TABLE 12

Dynamic Analysis Step 2 Resource Plans

Nbr run	TPV Ttl Soc.Cost '91-'00	TPV Ttl Soc.Cost '91-'30	Ryan 43 MW	Bird Firm'ng 60 MW	Thom'sn Falls 41 MW	Bird Peaking 60 MW	IPCo Exch'ng 50 MW	IPCo Exch'ng 76 MW	Tiber Hydro 5 MW	DSM	Westm'nd CC 92 MW	Stone #B 15 MW	LS Pwr 68 MW	Stone #C 38 MW	Basin Antelope 98 MW	Pump Hydro 100 MW	Comb'n Turb'n 33 MW
140 IEX+	1.0867	2.4766	0	0	1	1	0	1	1	1	1	1	0	0	0	0	0
94	1.0813	2.4766	0	0	1	1	0	0	1	1	0	0	0	1	1	0	1
14	1.0667	2.4768	1	0	1	1	1	0	1	1	0	1	0	1	1	0	0
33	1.0703	2.4768	1	1	1	0	1	0	0	1	0	1	0	0	1	0	0
44	1.0699	2.4769	1	1	0	0	0	0	1	1	0	1	0	1	1	0	0
59	1.0700	2.4769	0	1	0	0	1	0	0	1	0	1	0	0	1	0	2
77 IEX+	1.0773	2.4769	0	0	0	0	0	1	0	1	0	0	0	1	1	0	2
61	1.0704	2.4769	0	1	0	0	0	0	1	1	0	1	0	1	1	0	1
92	1.0825	2.4770	0	0	1	0	1	0	0	1	0	1	1	0	1	0	0
45 IEX+	1.0731	2.4770	0	0	0	0	0	1	1	1	0	1	1	0	1	0	1
57 IEX+	1.0764	2.4773	1	0	0	0	0	1	1	1	0	0	0	1	1	0	1
76	1.0809	2.4773	1	0	1	1	0	0	0	1	0	0	0	1	1	0	0
50 IEX+	1.0701	2.4773	0	1	0	0	0	1	0	1	0	1	0	0	1	0	2
116 IEX+	1.0775	2.4774	0	1	0	0	0	1	0	1	0	1	0	1	0	0	2
150	1.0835	2.4775	1	0	0	1	1	0	0	1	1	1	0	0	0	0	0
33 IEX+	1.0729	2.4776	1	0	0	0	0	1	0	1	0	1	0	1	1	0	2
57	1.0780	2.4777	1	0	1	1	1	0	1	1	0	0	0	1	1	0	0
80 IEX+	1.0830	2.4781	1	0	1	1	0	1	0	1	0	0	0	1	1	0	0
23	1.0699	2.4782	1	0	1	1	0	0	1	1	0	1	0	1	1	0	0
64	1.0766	2.4782	1	0	0	0	1	0	1	1	0	1	0	1	1	0	1
119 IEX+	1.0821	2.4783	1	0	0	1	0	1	1	1	1	0	0	0	0	0	0
73 IEX+	1.0730	2.4783	0	1	0	0	0	1	0	1	0	1	0	1	1	0	1
98 IEX+	1.0781	2.4787	0	0	0	1	0	1	0	1	1	0	0	0	1	0	0
121 IEX+	1.0823	2.4788	1	0	0	1	0	1	1	1	1	1	0	0	0	0	0
54 IEX+	1.0703	2.4788	0	1	0	0	0	1	1	1	0	0	0	0	1	0	2
43 IEX+	1.0778	2.4790	0	0	1	0	0	1	1	1	0	1	0	1	1	0	2
124	1.0793	2.4791	0	0	0	1	1	0	0	1	1	0	0	0	1	0	0
78	1.0782	2.4794	1	0	0	0	1	0	0	1	0	1	1	0	1	0	0
123	1.0795	2.4795	0	0	0	1	0	0	0	1	1	1	0	0	1	0	0
81	1.0813	2.4795	1	0	1	1	0	0	1	1	0	0	0	1	1	0	0

TABLE 12

Dynamic Analysis Step 2 Resource Plans

Nbr run	TPV Ttl Soc.Cost '91-'00	'91-'30	Ryan 43 MW	Bird Firm'ng 60 MW	Thom'sn Falls 41 MW	Bird Peaking 60 MW	IPCo Exch'ng 50 MW	IPCo Exch'ng 76 MW	Tiber Hydro 5 MW	DSM	Westm'nd CC 92 MW	Stone #B 15 MW	LS Pwr 68 MW	Stone #C 38 MW	Basin Antelope 98 MW	Pump Hydro 100 MW	Comb'n Turb'n 33 MW
84 IEX+	1.0777	2.4795	0	0	0	0	0	1	1	1	0	0	0	1	1	0	2
36	1.0707	2.4796	1	1	1	0	1	0	1	1	0	1	0	0	1	0	0
62	1.0704	2.4797	0	1	0	0	1	0	1	1	0	1	0	0	1	0	2
109	1.0791	2.4797	0	0	0	0	1	0	0	1	0	1	0	1	1	0	2
49 IEX+	1.0720	2.4797	0	1	1	0	0	1	0	1	0	0	0	0	1	0	1
129	1.0797	2.4798	0	0	0	1	0	0	0	1	1	0	0	0	1	0	0
95 IEX+	1.0788	2.4798	0	0	0	0	0	1	0	1	0	0	1	0	1	0	1
89	1.0737	2.4798	0	1	0	0	1	0	1	1	0	0	0	1	1	0	1
101 IEX+	1.0846	2.4799	0	0	1	0	0	1	0	1	0	0	1	0	1	0	0
132 IEX+	1.0813	2.4799	0	0	0	1	0	1	0	1	1	0	0	1	0	0	1
23 IEX+	1.0726	2.4800	1	0	1	0	0	1	0	1	0	1	0	1	1	0	1
56 IEX+	1.0705	2.4800	0	1	0	0	0	1	1	1	0	1	0	0	1	0	2
123 IEX+	1.0779	2.4802	0	1	0	0	0	1	1	1	0	1	0	1	0	0	2
63	1.0744	2.4802	1	0	0	1	1	0	1	1	0	1	0	1	1	0	1
153	1.0838	2.4802	1	0	0	1	1	0	1	1	1	1	0	0	0	0	0
59 IEX+	1.0822	2.4805	1	0	1	0	0	1	0	1	0	0	0	1	1	0	1
125 IEX+	1.0826	2.4806	1	0	0	1	0	1	0	1	1	0	0	1	0	0	0
53 IEX+	1.0722	2.4808	0	1	1	0	0	1	0	1	0	1	0	0	1	0	1
72	1.0827	2.4809	1	0	1	0	1	0	0	1	0	0	0	1	1	0	1
108	1.0775	2.4810	0	0	0	1	0	0	0	1	0	1	0	1	1	0	2
113	1.0795	2.4810	0	0	0	0	1	0	0	1	0	1	1	0	1	0	1
91 IEX+	1.0791	2.4810	1	0	0	1	0	1	0	1	0	0	0	1	1	0	1
87 IEX+	1.0800	2.4811	1	0	0	0	0	1	0	1	0	0	1	0	1	0	0
110	1.0839	2.4812	0	0	1	0	1	0	1	1	0	1	1	0	1	0	0
131 IEX+	1.0849	2.4813	1	0	0	0	0	1	0	1	1	1	0	1	0	0	0
118 IEX+	1.0799	2.4814	0	0	0	1	0	1	0	1	1	1	0	0	1	0	0
66	1.0731	2.4816	1	1	0	0	1	0	0	1	0	0	0	1	1	0	1
88 IEX+	1.0822	2.4817	0	0	1	0	0	1	0	1	0	1	1	0	1	0	0
61 IEX+	1.0727	2.4819	1	1	0	0	0	1	0	1	0	0	0	0	1	0	1
58 IEX+	1.0761	2.4820	1	0	0	0	0	1	0	1	0	1	1	0	1	0	0

Dynamic Analysis Step 2 Resource Plans

Nbr run	TPV Ttl Soc.Cost '91-'00	'91-'30	Ryan 43 MW	Bird Firm'ng 60 MW	Thom'sn Falls 41 MW	Bird Peaking 60 MW	IPCo Exch'ng 50 MW	IPCo Exch'ng 76 MW	Tiber Hydro 5 MW	DSM	Westm'nd CC 92 MW	Stone #B 15 MW	LS Pwr 68 MW	Stone #C 38 MW	Basin Antelope 98 MW	Pump Hydro 100 MW	Comb'n Turb'n 33 MW
99	1.0806	2.4821	1	0	0	0	1	0	0	1	0	0	1	0	1	0	0
82	1.0785	2.4822	1	0	0	0	1	0	1	1	0	1	1	0	1	0	0
68	1.0821	2.4822	1	0	1	0	1	0	0	1	0	1	0	1	1	0	1
139	1.0828	2.4823	0	1	1	0	1	0	0	1	0	0	0	0	1	0	1
112	1.0794	2.4823	0	0	0	0	1	0	1	1	0	1	0	1	1	0	2
55 IEX+	1.0724	2.4824	0	1	1	0	0	1	1	1	0	0	0	0	1	0	1
135	1.0801	2.4825	0	0	0	1	0	0	1	1	1	0	0	0	1	0	0
97 IEX+	1.0792	2.4826	0	0	0	0	0	1	1	1	0	0	1	0	1	0	1
25 IEX+	1.0729	2.4826	1	0	1	0	0	1	1	1	0	1	0	1	1	0	1
95	1.0829	2.4828	0	0	1	0	1	0	0	1	0	0	0	1	1	0	2
107 IEX+	1.0850	2.4828	0	0	1	0	0	1	1	1	0	0	1	0	1	0	0
62 IEX+	1.0825	2.4828	1	0	1	0	0	1	1	1	0	0	0	1	1	0	1
142	1.0808	2.4829	0	0	0	1	1	0	1	1	1	0	0	0	1	0	0
63 IEX+	1.0730	2.4830	1	1	0	0	0	1	0	1	0	1	0	0	1	0	1
124 IEX+	1.0826	2.4831	0	1	1	0	0	1	0	1	0	1	0	1	0	0	2
89 IEX+	1.0828	2.4832	0	0	1	0	0	1	0	1	0	0	0	1	1	0	2
79	1.0832	2.4833	1	0	1	0	1	0	1	1	0	0	0	1	1	0	1
116	1.0781	2.4833	1	1	0	0	1	0	0	1	0	0	0	0	1	0	1
47	1.0726	2.4837	1	0	0	1	0	0	0	1	0	1	0	1	1	0	2
91	1.0802	2.4837	1	1	1	0	0	0	1	1	0	1	0	0	1	0	0
122 IEX+	1.0803	2.4837	0	0	0	1	0	1	0	1	0	0	0	1	1	0	2
115	1.0798	2.4838	0	0	0	0	1	0	1	1	0	1	1	0	1	0	1
93	1.0760	2.4840	1	1	0	0	0	0	1	1	0	1	0	0	1	0	1
92 IEX+	1.0805	2.4841	1	0	0	0	0	1	1	1	0	0	1	0	1	0	0
103 IEX+	1.0781	2.4843	1	1	0	0	0	1	0	1	0	1	0	1	0	0	2
97	1.0831	2.4843	0	0	1	0	1	0	0	1	0	1	0	1	1	0	2
69 IEX+	1.0782	2.4844	1	0	0	0	0	1	0	1	0	0	0	1	1	0	2
65 IEX+	1.0731	2.4846	1	1	0	0	0	1	1	1	0	0	0	0	1	0	1
30	1.0719	2.4847	1	0	1	1	0	0	0	1	0	1	0	1	1	0	1
70	1.0825	2.4848	1	0	1	0	1	0	1	1	0	1	0	1	1	0	1

Dynamic Analysis Step 2 Resource Plans

Nbr run	TPV Ttl Soc.Cost '91-'00	TPV Ttl Soc.Cost '91-'30	Ryan 43 MW	Bird Firm'ng 60 MW	Thom'sn Falls 41 MW	Bird Peaking 60 MW	IPCo Exch'ng 50 MW	IPCo Exch'ng 76 MW	Tiber Hydro 5 MW	DSM	Westm'nd CC 92 MW	Stone #B 15 MW	LS Pwr 68 MW	Stone #C 38 MW	Basin Antelope 98 MW	Pump Hydro 100 MW	Comb'n Turb'n 33 MW
60 IEX+	1.0764	2.4848	1	0	0	0	0	1	1	1	0	1	1	0	1	0	0
107	1.0810	2.4850	1	0	0	0	1	0	1	1	0	0	1	0	1	0	0
144	1.0831	2.4850	0	1	1	0	1	0	1	1	0	0	0	0	1	0	1
117	1.0832	2.4851	0	0	1	1	0	0	0	1	0	0	0	1	1	0	2
103	1.0833	2.4855	0	0	1	0	1	0	1	1	0	0	0	1	1	0	2
84	1.0786	2.4856	1	0	0	0	1	0	0	1	0	1	0	1	1	0	2
68 IEX+	1.0734	2.4856	1	1	0	0	0	1	1	1	0	1	0	0	1	0	1
141 IEX+	1.0841	2.4857	1	0	0	1	0	1	0	1	1	0	0	0	0	0	1
127 IEX+	1.0830	2.4859	0	1	1	0	0	1	1	1	0	1	0	1	0	0	2
93 IEX+	1.0833	2.4860	0	0	1	0	0	1	1	1	0	0	0	1	1	0	2
120	1.0785	2.4861	1	1	0	0	1	0	1	1	0	0	0	0	1	0	1
86	1.0778	2.4861	0	1	1	0	1	0	0	1	0	1	0	0	1	0	2
96	1.0832	2.4863	1	0	1	1	0	0	0	1	0	0	0	1	1	0	1
150 IEX+	1.0891	2.4864	0	0	1	0	0	1	0	1	0	1	0	0	1	0	2
87	1.0796	2.4864	0	0	1	1	0	0	0	1	0	1	0	1	1	0	2
67	1.0777	2.4865	0	0	1	1	0	0	1	1	0	1	0	1	1	0	2
143 IEX+	1.0843	2.4866	1	0	0	1	0	1	0	1	1	1	0	0	0	0	1
50	1.0730	2.4866	1	0	0	1	0	0	1	1	0	1	0	1	1	0	2
101	1.0801	2.4868	1	0	0	0	1	0	0	1	0	0	1	1	1	0	0
108 IEX+	1.0784	2.4870	1	1	0	0	0	1	1	1	0	1	0	1	0	0	2
71 IEX+	1.0786	2.4872	1	0	0	0	0	1	1	1	0	0	0	1	1	0	2
69	1.0734	2.4872	1	1	0	0	1	0	0	1	0	1	0	0	1	0	2
106	1.0835	2.4873	0	0	1	0	1	0	1	1	0	1	0	1	1	0	2
34	1.0723	2.4875	1	0	1	1	0	0	1	1	0	1	0	1	1	0	1
74	1.0737	2.4875	1	1	0	0	0	0	0	1	0	1	0	1	1	0	1
102 IEX+	1.0819	2.4876	1	0	0	0	0	1	0	1	0	0	1	1	1	0	0
49	1.0727	2.4877	1	1	1	0	1	0	0	1	0	1	0	0	1	0	1
117 IEX+	1.0816	2.4878	0	1	1	0	0	1	1	1	0	1	0	0	1	0	1
121	1.0837	2.4879	0	0	1	1	0	0	1	1	0	0	0	1	1	0	2
145 IEX+	1.0845	2.4883	1	0	0	1	0	1	1	1	1	0	0	0	0	0	1

TABLE 12

Dynamic Analysis Step 2 Resource Plans

Nbr run	TPV Ttl Soc.Cost '91-'00	TPV Ttl Soc.Cost '91-'30	Ryan 43 MW	Bird Firm'ng 60 MW	Thom'sn Falls 41 MW	Bird Peaking 60 MW	IPCo Exch'ng 50 MW	IPCo Exch'ng 76 MW	Tiber Hydro 5 MW	DSM	Westm'nd CC 92 MW	Stone #B 15 MW	LS Pwr 68 MW	Stone #C 38 MW	Basin Antelope 98 MW	Pump Hydro 100 MW	Comb'n Turb'n 33 MW
85	1.0790	2.4885	1	0	0	0	1	0	1	1	0	1	0	1	1	0	2
106 IEX+	1.0803	2.4886	1	1	1	0	0	1	0	1	0	1	0	1	0	0	1
104	1.0836	2.4888	1	0	1	1	0	0	1	1	0	0	0	1	1	0	1
88	1.0782	2.4889	0	1	1	0	1	0	1	1	0	1	0	0	1	0	2
85 IEX+	1.0779	2.4893	0	0	0	0	0	1	0	1	0	1	1	0	1	0	2
148 IEX+	1.0847	2.4894	1	0	0	1	0	1	1	1	1	1	0	0	0	0	1
135 IEX+	1.0859	2.4897	1	1	1	0	0	1	0	1	0	0	0	1	1	0	0
136	1.0797	2.4897	1	1	0	0	0	0	0	1	0	0	0	1	1	0	1
71	1.0738	2.4899	1	1	0	0	1	0	1	1	0	1	0	0	1	0	2
104 IEX+	1.0810	2.4900	1	0	0	0	0	1	0	1	1	0	0	0	1	0	0
142 IEX+	1.0861	2.4900	1	0	1	1	0	1	0	1	1	0	0	0	0	0	0
98	1.0805	2.4901	1	0	0	0	1	0	0	1	0	1	1	0	1	0	1
134	1.0854	2.4903	1	1	1	0	0	0	0	1	0	0	0	1	1	0	0
53	1.0731	2.4905	1	1	1	0	1	0	1	1	0	1	0	0	1	0	1
137 IEX+	1.0832	2.4907	0	0	0	0	0	1	0	1	0	0	1	1	1	0	1
131	1.0774	2.4907	0	1	0	0	1	0	0	1	0	0	0	1	1	0	2
168	1.0805	2.4908	0	1	0	0	1	0	1	1	0	0	0	0	1	0	2
70 IEX+	1.0743	2.4908	0	1	1	0	0	1	0	1	0	0	0	0	1	0	2
156	1.0820	2.4908	0	0	0	1	0	0	0	1	1	0	0	0	1	0	1
144 IEX+	1.0863	2.4910	1	0	1	1	0	1	0	1	1	1	0	0	0	0	0
138	1.0887	2.4910	1	0	1	0	0	0	0	1	0	1	0	1	1	0	1
114 IEX+	1.0812	2.4911	0	0	0	0	0	1	0	1	0	0	1	0	1	0	2
126 IEX+	1.0868	2.4913	0	0	1	0	0	1	0	1	0	0	1	0	1	0	1
127	1.0829	2.4916	1	0	0	0	0	0	0	1	0	1	1	1	1	0	0
110 IEX+	1.0807	2.4917	1	1	1	0	0	1	1	1	0	1	0	1	0	0	1
90 IEX+	1.0783	2.4920	0	0	0	0	0	1	1	1	0	1	1	0	1	0	2
105 IEX+	1.0822	2.4920	1	0	0	0	0	1	0	1	0	0	1	0	1	0	1
269	1.0899	2.4923	0	0	0	1	1	0	1	1	1	0	0	1	0	0	1
146 IEX+	1.0865	2.4923	1	0	1	1	0	1	1	1	1	0	0	0	0	0	0
125	1.0830	2.4925	1	0	0	0	1	0	0	1	0	0	1	0	1	0	1

TABLE 12

Dynamic Analysis Step 2 Resource Plans

Nbr run	TPV Ttl Soc.Cost '91-'00	TPV Ttl Soc.Cost '91-'30	Ryan 43 MW	Bird Firm'ng 60 MW	Thom'sn Falls 41 MW	Bird Peaking 60 MW	IPCo Exch'ng 50 MW	IPCo Exch'ng 76 MW	Tiber Hydro 5 MW	DSM	Westm'nd CC 92 MW	Stone #B 15 MW	LS Pwr 68 MW	Stone #C 38 MW	Basin Antelope 98 MW	Pump Hydro 100 MW	Comb'n Turb'n 33 MW
140	1.0801	2.4926	1	1	0	0	0	0	1	1	0	0	0	1	1	0	1
217	1.0908	2.4927	1	1	1	0	1	0	1	1	0	0	0	1	0	0	1
137	1.0818	2.4927	0	0	0	0	1	0	0	1	0	1	1	0	1	0	2
76 IEX+	1.0783	2.4928	1	0	0	0	0	1	0	1	0	1	1	0	1	0	1
146	1.0807	2.4929	1	1	0	0	1	0	1	1	0	0	0	1	1	0	1
105	1.0809	2.4929	1	0	0	0	1	0	1	1	0	1	1	0	1	0	1
149 IEX+	1.0867	2.4936	1	0	1	1	0	1	1	1	1	1	0	0	0	0	0
143	1.0891	2.4937	1	0	1	0	0	0	1	1	0	1	0	1	1	0	1
161	1.0824	2.4938	0	0	0	1	0	0	1	1	1	0	0	0	1	0	1
120 IEX+	1.0816	2.4940	0	0	0	0	0	1	1	1	0	0	1	0	1	0	2
128 IEX+	1.0872	2.4941	0	0	1	0	0	1	1	1	0	0	1	0	1	0	1
149	1.0869	2.4942	1	1	1	0	0	0	1	1	0	0	0	1	1	0	0
147 IEX+	1.0821	2.4942	1	1	0	0	0	1	0	1	0	0	0	1	1	0	1
139 IEX+	1.0850	2.4946	1	0	0	0	0	1	1	1	1	0	0	0	1	0	0
145	1.0805	2.4947	1	1	0	0	1	0	0	1	0	0	0	0	1	0	2
111 IEX+	1.0826	2.4949	1	0	0	0	0	1	1	1	0	0	1	0	1	0	1
118	1.0825	2.4950	1	1	1	0	0	0	1	1	0	1	0	0	1	0	1
122	1.0782	2.4954	1	1	0	0	0	0	1	1	0	1	0	1	1	0	1
126	1.0878	2.4954	1	0	1	0	1	0	0	1	0	0	0	1	1	0	2
82 IEX+	1.0787	2.4954	1	0	0	0	0	1	1	1	0	1	1	0	1	0	1
130	1.0834	2.4955	1	0	0	0	1	0	1	1	0	0	1	0	1	0	1
119	1.0784	2.4955	1	1	0	0	0	0	1	1	0	1	0	0	1	0	2
141	1.0822	2.4955	0	0	0	0	1	0	1	1	0	1	1	0	1	0	2
130 IEX+	1.0842	2.4971	1	0	0	0	0	1	1	1	0	1	0	1	1	0	2
148	1.0809	2.4975	1	1	0	0	1	0	1	1	0	0	0	0	1	0	2
100	1.0826	2.4975	1	0	1	0	1	0	0	1	0	1	1	0	1	0	0
132	1.0882	2.4979	1	0	1	0	1	0	1	1	0	0	0	1	1	0	2
147	1.0827	2.4986	1	1	1	0	1	0	0	1	0	0	0	0	1	0	1
109 IEX+	1.0846	2.4994	1	0	1	0	0	1	0	1	0	0	1	0	1	0	0
128	1.0851	2.4994	1	0	1	0	1	0	0	1	0	0	1	0	1	0	0

TABLE 12

Dynamic Analysis Step 2 Resource Plans

Nbr run	TPV Ttl Soc.Cost '91-'00	TPV Ttl Soc.Cost '91-'30	Ryan 43 MW	Bird Firm'ng 60 MW	Thom'sn Falls 41 MW	Bird Peaking 60 MW	IPCo Exch'ng 50 MW	IPCo Exch'ng 76 MW	Tiber Hydro 5 MW	DSM	Westm'nd CC 92 MW	Stone #B 15 MW	LS Pwr 68 MW	Stone #C 38 MW	Basin Antelope 98 MW	Pump Hydro 100 MW	Comb'n Turb'n 33 MW
129 IEX+	1.0827	2.5003	1	1	1	0	0	1	0	1	0	1	0	1	0	0	2
155	1.0883	2.5012	1	0	1	1	0	0	0	1	0	0	0	1	1	0	2
261	1.0916	2.5019	0	1	1	0	0	0	0	1	0	0	0	0	1	0	2
112 IEX+	1.0850	2.5019	1	0	1	0	0	1	1	1	0	0	1	0	1	0	0
133	1.0854	2.5020	1	0	1	0	1	0	1	1	0	0	1	0	1	0	0
165	1.0910	2.5024	1	0	1	0	0	0	0	1	0	1	0	1	1	0	2
134 IEX+	1.0831	2.5032	1	1	1	0	0	1	1	1	0	1	0	1	0	0	2
262	1.0914	2.5061	1	0	0	1	1	0	1	1	1	1	0	0	0	0	2
111	1.0779	2.5122	0	0	0	1	0	0	0	1	0	1	0	1	1	1	0
159	1.0878	2.5124	1	0	1	0	1	0	1	1	0	0	1	0	1	0	1
212	1.0938	2.5141	1	0	1	0	0	0	1	1	0	1	1	0	1	0	1
114	1.0783	2.5151	0	0	0	1	0	0	1	1	0	1	0	1	1	1	0
223	1.0845	2.5291	0	1	0	0	1	0	0	1	0	1	0	0	1	1	0
252	1.0932	2.5293	0	0	1	1	0	0	0	1	0	0	0	1	1	1	0
232	1.0850	2.5302	0	1	0	0	0	0	0	1	0	1	0	0	1	1	0
231	1.0850	2.5324	0	1	0	0	1	0	1	1	0	1	0	0	1	1	0
185	1.0814	2.5332	0	1	0	0	0	0	0	1	0	1	0	1	1	1	0
243	1.0854	2.5332	0	1	0	0	0	0	1	1	0	1	0	0	1	1	0
193	1.0818	2.5361	0	1	0	0	0	0	1	1	0	1	0	1	1	1	0
235	1.0871	2.5387	1	1	0	0	0	0	0	1	0	1	0	0	1	1	0
263	1.0916	2.5395	0	1	1	0	0	0	0	1	0	1	0	0	1	1	0
246	1.0875	2.5420	1	1	0	0	0	0	1	1	0	1	0	0	1	1	0
271	1.0878	2.5461	0	1	0	0	0	0	1	1	0	1	0	0	1	1	1

Final Resource Plan Incremental Revenue Requirement K$

	Plan 2	Plan 4	Plan 7	Plan 56	Plan 92	Plan 124	Plan 66	Plan 101	Plan 113	Plan 133	Plan 142	Plan 2 X	Plan 28
1992	131645	131645	131645	131514	131492	131600	131461	131480	131601	131619	131602	131634	131632
1993	150081	150081	150081	150064	149992	149956	149795	149960	149971	150119	149972	150060	150165
1994	165727	165736	165728	165943	165669	165494	165309	165649	165536	165830	165546	165764	165873
1995	179935	179961	179946	180711	180450	179825	179668	180427	180019	180578	180049	180121	180838
1996	198363	198533	198422	219815	212119	201850	203002	218944	209387	214586	209597	206652	216984
1997	233842	234669	234268	244986	246948	248969	245342	247071	251017	252719	251788	236742	243852
1998	249081	250841	256604	259434	261562	263908	259567	261460	265540	267218	267178	251574	258526
1999	264383	278391	271803	273561	275870	278886	273964	275735	280004	281287	293781	266590	272885
2000	285698	294504	291819	293344	295400	298349	293619	295528	299543	300393	309059	286858	292958
2001	306765	315292	312589	313522	316326	319820	314836	316259	319913	320551	329029	307936	313358
2002	329462	337452	334709	334981	338549	342469	337676	338561	341148	342004	350199	330122	334909
2003	348931	356162	353787	353441	357458	361565	356816	357381	359660	360170	367931	349686	354258
2004	367948	374472	372500	371350	375076	379867	374783	375198	377345	377456	384862	368525	372452
2005	405023	410391	409020	407134	410002	415461	410684	411054	412842	412481	419361	405062	408138
2006	420567	425222	424235	421789	424680	430342	425003	424984	427204	426059	432804	420082	423290
2007	441765	445684	445091	442298	444898	450707	439585	439492	441026	439462	445838	435653	444059
2008	451593	454833	454864	451447	454985	460269	454960	454869	455446	453418	459517	451888	453701
2009	469219	471748	471919	468066	471612	477248	471991	471753	471860	469311	474917	469689	471114
2010	487529	489183	489911	488411	492012	494705	489451	492279	488451	485367	490576	488074	489127
2011	530024	530810	532087	510777	503394	510147	508010	497771	502963	499322	504112	515553	505472
2012	536432	535947	538613	530182	521664	510485	510161	515684	512221	508040	512549	536262	524376
2013	559884	558347	561455	551887	542104	530776	530480	535821	532074	527229	531271	559220	546104
2014	584312	581779	585558	574671	563517	551778	551509	556869	552662	547170	550762	583368	568619
2015	608440	604868	609354	597058	584397	572228	571968	577363	572684	566509	569635	607185	590707
2016	632369	627846	633326	619980	605552	592100	592109	598063	592292	585542	588143	631417	612918
2017	658692	652937	658941	644619	628222	614303	614312	620365	614134	606676	608633	657236	637513
2018	685127	678211	685162	669315	650878	636216	636225	642559	635660	627466	628846	683381	661803
2019	711731	703835	711597	694156	673641	658237	658245	664903	657279	648306	649318	709767	686342
2020	738793	729141	737883	718965	696766	680399	680408	687712	679119	669425	670190	736311	710926
2021	769573	758311	767537	747475	723490	744009	744016	714411	742258	730763	730756	766571	740174
2022	800037	787396	797506	776031	750126	774110	774118	740889	771945	759541	759080	797015	769048
2023	832225	818128	829174	806222	778279	805987	805994	768897	803387	790033	789086	829207	799624
2024	863692	848420	860892	836164	805912	837764	837771	796262	833969	819775	818532	861265	829389
2025	900633	883455	896734	870697	838003	874061	874068	828246	870947	855082	853409	897839	865023
2026	937329	918442	932848	905125	868720	910581	910588	890091	906997	889954	887763	942583	899909
2027	975655	954961	970558	942098	932656	948795	948802	926584	944717	926444	923693	969460	932667
2028	1012728	990499	1007926	976183	965287	986534	986541	961717	981003	961563	958533	1006336	965296
2029	1057025	1032398	1050602	1018434	1010072	1030150	1030156	1004181	1025000	1004029	1000080	1050933	1010080
2030	1100425	1073652	1093255	1059137	1051417	1073663	1073668	1045658	1067942	1045503	1040899	1094430	1051425
Disc=11.23%													
1992-2030 K$													
TPV M$	2624.74	2641.53	2643.56	2644.71	2634.94	2642.72	2622.33	2631.40	2641.70	2638.25	2660.88	2630.51	2637.09
Levelized M$	299.48	301.39	301.62	301.75	300.64	301.53	299.20	300.24	301.41	301.02	303.60	300.13	300.88

TABLE 13

ann_rr.wk1

07/28/92
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TABLE 14

EXPECTED WATER

		RESOURCE TIMINGS												
		Business Plan Equivalent						RFP Resource						
		Ry	Bird Firm	TF	Id Exc	Ston #B	Bsn #6	Bird Peak	Tibr #14	West #66	LS #35	Ston #C	PPwr #38	CT
TEST	Plan Nbr													
W/O Ry,T.F.	1				98	96	97	97				96		
W/O Ry,T.F.	2				98	96	97	97	00			96		
W/O Ry,T.F.	3				98	96	97	97				96		00
W/O Ry,W/T.F.	4			00	98	96	97	97				96		
W/O Ry,W/T.F.	6			00	98	96	97	97	00			96		
W/O Ry,W/T.F.	25			97	98		96	97				96		
W/O T.F.W/Ry	31	97	97		98		96					96		
W/O T.F.W/Ry	7	99			98	96	97	97				96		
W/O T.F.W/Ry	13	98				96	97	97				96		
W/Ry,&T.F.	54	97		97	98		96					96		
W/Ry,&T.F.	49	97		97	98	96	97					96		
W/Ry,&T.F.	12	99		00	98	96	97	97				96		
W/#66	90				98	96		97		97		96		
W/#66	119				98		97	97		96				
W/#66	125						97	97		96				
W/#35	39				98		96				97	96		
W/#35	120				98	97	96				97			96
W/#35	144			97	98	97	97				96			

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NO DEE

TABLE 15

		Resource Timings With SASA DSM												
		Business Plan Equivalent					RFP Resource							
TEST	Plan Nbr	Ry	Bird Firm	TF	Id Exc	Bsn #6	Bird Peak	West #66	West #65	LS #35	Ston #C	West #64	#28	#38
W/O Ry,T.F.	2						97		96			97		
W/O Ry,T.F.	4				98	96				97	96			
W/O Ry,T.F.	11				98	97	97	96						
W/O Ry,W/T.F.	5			97	98	96	97				96			
W/O Ry,W/T.F.	6			97	98	96	97				96	00		
W/O Ry,W/T.F.	9			97	98	96					96	97		
W/O T.F.W/Ry	1	98					97		96					
W/O T.F.W/Ry	3	98					97		96			98		
W/O T.F.W/Ry	62	97			98		97	96			97			
W/Ry,&T.F.	16	97		97	98	96					96			
W/Ry,&T.F.	24	97		97	98	96					96	00		
W/Ry,&T.F.	15	99		97	98	96	97				96			
W/#66	11				98	97	97	96						
W/#66	14					97	97	96						
W/#66	22					97	97	96				00		
W/#65	2						97		96			97		
W/#65	1	98					97		96					
W/#65	3	98					97		96			98		
W/#35	4				98	96				97	96			
W/#35	27	97			98	97				96				
W/#35	66				98	96				97		96,97		
W/#28	123				98		97					97	96	
W/#28	124	97			98		97						96	
W/#28	158				98		97					97,98	96	
W/#38	10				98				96					97
W/#38	13								96					97
W/#38	7						97		96					98
B.PLN TF,Ry,BRD	26	98		97		96	97				96			
	19	98			98	96				97	96			
	17	97		00	98	97				96				

TABLE 16

DSM R&U ANALYSIS

Similar Resource Plans
07/21/92
11:10 AM

RESOURCE PLANS WITH EEAF

	2030		Dif From SASA		2000 S or D		Resource Timings (e.g. 98 = 1998,00 = 2000)												DSM
Plan #	TTL M$	LvlM$*	Lvl M$	%	MWa	MW	Ry	Bird Firm	TF	Id Exc	Ston #B	Bsn #06	Bird Peak	Tibr #14	West #66	LS #35	Ston #C	PPwr #38	CT	TYPE
2	2,443.2	278.3			76	−5				98	96	97	97	00			96			SASA
45	2,502.9	285.1	6.8	2.4%	85	−4				98		97	97		96					SSSS
1	2,421.6	275.9	−2.5	−0.9%	72	1				98		97	97				96			AAAA
4	2,455.3	279.7			87	40			00	98	96	97	97				96			SASA
1	2,485.9	283.2	3.5	1.2%	68	12			97	98	97	96	97	96			96			SSSS
35	2,435.1	277.4	−2.3	−0.8%	71	33			97	98	96	96	97	96						AAAA
7	2,458.7	280.1			72	33	99			98	96	97	97				96			SASA
3	2,495.6	284.3	4.2	1.5%	94	0	97	97		98	00	96					96			SSSS
17	2,437.8	277.7	−2.4	−0.9%	82	−1	97			98	97	97					96			AAAA
56	2,472.7	281.7			71	8	97		97	98		96					96			SASA
18	2,503.9	285.2	3.6	1.3%	69	55	99		97	98	97	96	97	96			96			SSSS
25	2,453.3	279.5	−2.2	−0.8%	98	49	97		00	98	97	97					96			AAAA
124	2,479.1	282.4			109	29				98		97	97		96					SASA
45	2,502.9	285.1	2.7	1.0%	85	−4				98		97	97		96					SSSS
185	2,458.8	280.1	−2.3	−0.8%	82	0	97			98			97		96					AAAA
92	2,477.0	282.2			108	10			97	98	96	96				97				SASA
57	2,506.8	285.6	3.4	1.2%	106	0			97	98		96				97	96			SSSS
116	2,465.0	280.8	−1.4	−0.5%	107	29	97			98	96	96				97				AAAA

* Lvl M$ is levelized million dollars.
UCR(11.23%,40yr)= 0.114

TABLE 17
JANUARY SYSTEM LOAD SHAPE AND DEMAND-SIDE LOAD PROFILES

SYSTEM LOAD SHAPE FOR JANUARY

Hour Ending	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Monday	0.66	0.63	0.62	0.63	0.65	0.73	0.78	0.88	0.89	0.88	0.88	0.87	0.85	0.84	0.82	0.83	0.86	0.93	0.98	0.92	0.89	0.86	0.78	0.75
Tuesday	0.70	0.66	0.66	0.66	0.68	0.73	0.80	0.91	0.91	0.88	0.88	0.87	0.85	0.83	0.81	0.82	0.84	0.92	0.99	0.92	0.91	0.86	0.79	0.75
Wednesday	0.72	0.70	0.69	0.68	0.71	0.74	0.82	0.95	0.93	0.90	0.89	0.87	0.84	0.82	0.81	0.82	0.85	0.93	1.00	0.94	0.90	0.87	0.80	0.76
Thursday	0.73	0.71	0.69	0.68	0.71	0.74	0.82	0.97	0.95	0.90	0.88	0.86	0.84	0.82	0.81	0.81	0.83	0.90	0.96	0.91	0.88	0.86	0.79	0.75
Friday	0.72	0.68	0.69	0.67	0.70	0.74	0.80	0.92	0.93	0.90	0.89	0.87	0.85	0.83	0.81	0.81	0.83	0.88	0.89	0.87	0.86	0.83	0.78	0.76
Saturday	0.73	0.70	0.69	0.67	0.67	0.71	0.74	0.76	0.80	0.84	0.86	0.85	0.81	0.79	0.77	0.77	0.78	0.85	0.86	0.83	0.81	0.79	0.76	0.75
Sunday	0.70	0.65	0.65	0.64	0.65	0.67	0.72	0.75	0.77	0.78	0.80	0.79	0.79	0.78	0.77	0.76	0.77	0.83	0.85	0.85	0.84	0.80	0.76	0.72

DEMAND-SIDE RESIDENTIAL SECTOR JANUARY SHAPE

Hour Ending	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Monday	0.05	0.93	0.78	0.66	0.61	0.58	0.44	0.44	0.05	0.10	0.14	0.15	0.16	0.16	0.17	0.17	0.22	0.14	0.65	0.67	0.21	0.23	0.24	0.20
Tuesday	0.05	0.93	0.78	0.66	0.61	0.58	0.44	0.44	0.05	0.10	0.14	0.15	0.16	0.16	0.17	0.17	0.22	0.14	0.65	0.67	0.21	0.23	0.24	0.20
Wednesday	0.05	0.93	0.78	0.66	0.61	0.58	0.44	0.44	0.05	0.10	0.14	0.15	0.16	0.16	0.17	0.17	0.22	0.14	0.65	0.67	0.21	0.23	0.24	0.20
Thursday	0.05	0.93	0.78	0.66	0.61	0.58	0.44	0.44	0.05	0.10	0.14	0.15	0.16	0.16	0.17	0.17	0.22	0.14	0.65	0.67	0.21	0.23	0.24	0.20
Friday	0.05	0.93	0.78	0.66	0.61	0.58	0.44	0.44	0.05	0.10	0.14	0.15	0.16	0.16	0.17	0.17	0.22	0.14	0.65	0.67	0.21	0.23	0.24	0.20
Saturday	0.06	1.00	0.79	0.66	0.60	0.55	-0.22	0.32	0.42	0.29	0.33	0.36	0.11	0.13	0.14	0.15	0.15	0.16	0.71	0.71	0.25	0.27	0.27	0.28
Sunday	0.06	1.00	0.79	0.66	0.60	0.55	-0.22	0.32	0.42	0.29	0.33	0.36	0.11	0.13	0.14	0.15	0.15	0.16	0.71	0.71	0.25	0.27	0.27	0.28

DEMAND-SIDE COMMERCIAL SECTOR JANUARY SHAPE

Hour Ending	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Monday	0.85	0.86	0.86	0.86	0.85	0.87	0.91	0.94	0.89	0.97	0.97	0.98	0.93	0.91	0.92	0.95	0.94	0.72	0.81	0.94	0.98	0.97	0.93	0.93
Tuesday	0.85	0.86	0.86	0.86	0.85	0.87	0.91	0.94	0.89	0.97	0.97	0.98	0.93	0.91	0.92	0.95	0.94	0.72	0.81	0.94	0.98	0.97	0.93	0.93
Wednesday	0.85	0.86	0.86	0.86	0.85	0.87	0.91	0.94	0.89	0.97	0.97	0.98	0.93	0.91	0.92	0.95	0.94	0.72	0.81	0.94	0.98	0.97	0.93	0.93
Thursday	0.85	0.86	0.86	0.86	0.85	0.87	0.91	0.94	0.89	0.97	0.97	0.98	0.93	0.91	0.92	0.95	0.94	0.72	0.81	0.94	0.98	0.97	0.93	0.93
Friday	0.85	0.86	0.86	0.86	0.85	0.87	0.91	0.94	0.89	0.97	0.97	0.98	0.93	0.91	0.92	0.95	0.94	0.72	0.81	0.94	0.98	0.97	0.93	0.93
Saturday	0.93	0.89	0.89	0.90	0.89	0.90	0.91	0.90	0.96	0.99	0.98	1.00	0.99	0.98	0.96	0.94	0.91	0.89	0.81	0.84	0.85	0.87	0.85	0.88
Sunday	0.93	0.89	0.89	0.90	0.89	0.90	0.91	0.90	0.96	0.99	0.98	1.00	0.99	0.98	0.96	0.94	0.91	0.89	0.81	0.84	0.85	0.87	0.85	0.88

DEMAND-SIDE INDUSTRIAL AND CONTRACT INDUSTRIAL JANUARY SHAPE

Hour Ending	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Monday	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.00	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Tuesday	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.00	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Wednesday	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.00	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Thursday	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.00	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Friday	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.00	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Saturday	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.00	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Sunday	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.00	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.75	0.75	0.75	0.75	0.75	0.75	0.75

TABLE 17
JULY SYSTEM LOAD SHAPE AND DEMAND-SIDE LOAD PROFILES

SYSTEM LOAD SHAPE FOR JULY

Hour Ending	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Monday	0.72	0.69	0.67	0.65	0.66	0.68	0.73	0.77	0.85	0.88	0.92	0.94	0.93	0.98	0.97	0.95	0.94	0.91	0.90	0.88	0.88	0.89	0.87	0.77
Tuesday	0.74	0.71	0.70	0.66	0.67	0.70	0.74	0.79	0.85	0.89	0.91	0.93	0.93	0.95	0.96	0.98	0.95	0.94	0.91	0.89	0.89	0.90	0.87	0.78
Wednesday	0.75	0.72	0.70	0.69	0.69	0.69	0.74	0.79	0.85	0.88	0.92	0.94	0.92	0.96	0.96	0.99	0.98	0.94	0.91	0.89	0.87	0.90	0.87	0.81
Thursday	0.76	0.73	0.71	0.70	0.69	0.71	0.74	0.80	0.86	0.88	0.91	0.93	0.92	0.95	0.97	1.00	0.95	0.93	0.91	0.88	0.87	0.90	0.87	0.80
Friday	0.76	0.73	0.71	0.69	0.69	0.71	0.74	0.80	0.86	0.89	0.92	0.93	0.93	0.96	0.95	0.94	0.92	0.91	0.89	0.87	0.86	0.86	0.86	0.77
Saturday	0.75	0.72	0.70	0.67	0.67	0.68	0.68	0.72	0.76	0.80	0.84	0.85	0.84	0.84	0.83	0.83	0.83	0.84	0.82	0.81	0.82	0.83	0.82	0.76
Sunday	0.73	0.70	0.68	0.66	0.65	0.64	0.62	0.68	0.72	0.75	0.77	0.78	0.78	0.79	0.78	0.78	0.81	0.82	0.81	0.80	0.82	0.84	0.83	0.74

DEMAND-SIDE RESIDENTIAL JULY SHAPE

Hour Ending	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Monday	0.09	0.09	0.09	0.09	0.09	0.13	0.90	0.76	0.10	0.10	0.13	0.10	0.11	0.14	0.12	0.12	0.20	0.24	1.00	1.00	0.31	0.27	0.27	0.18
Tuesday	0.09	0.09	0.09	0.09	0.09	0.13	0.90	0.76	0.10	0.10	0.13	0.10	0.11	0.14	0.12	0.12	0.20	0.24	1.00	1.00	0.31	0.27	0.27	0.18
Wednesday	0.09	0.09	0.09	0.09	0.09	0.13	0.90	0.76	0.10	0.10	0.13	0.10	0.11	0.14	0.12	0.12	0.20	0.24	1.00	1.00	0.31	0.27	0.27	0.18
Thursday	0.09	0.09	0.09	0.09	0.09	0.13	0.90	0.76	0.10	0.10	0.13	0.10	0.11	0.14	0.12	0.12	0.20	0.24	1.00	1.00	0.31	0.27	0.27	0.18
Friday	0.09	0.09	0.09	0.09	0.09	0.13	0.90	0.76	0.10	0.10	0.13	0.10	0.11	0.14	0.12	0.12	0.20	0.24	1.00	1.00	0.31	0.27	0.27	0.18
Saturday	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.76	0.77	0.56	0.56	0.57	0.13	0.13	0.13	0.13	0.13	0.13	0.98	0.98	0.33	0.27	0.27	0.27
Sunday	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.76	0.77	0.56	0.56	0.57	0.13	0.13	0.13	0.13	0.13	0.13	0.98	0.98	0.33	0.27	0.27	0.27

DEMAND-SIDE COMMERCIAL JULY SHAPE

Hour Ending	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Monday	0.24	0.23	0.22	0.22	0.22	0.24	0.27	0.34	0.83	0.99	0.93	0.91	0.92	0.94	0.96	0.97	1.00	0.80	0.41	0.39	0.37	0.34	0.29	0.27
Tuesday	0.24	0.23	0.22	0.22	0.22	0.24	0.27	0.34	0.83	0.99	0.93	0.91	0.92	0.94	0.96	0.97	1.00	0.80	0.41	0.39	0.37	0.34	0.29	0.27
Wednesday	0.24	0.23	0.22	0.22	0.22	0.24	0.27	0.34	0.83	0.99	0.93	0.91	0.92	0.94	0.96	0.97	1.00	0.80	0.41	0.39	0.37	0.34	0.29	0.27
Thursday	0.24	0.23	0.22	0.22	0.22	0.24	0.27	0.34	0.83	0.99	0.93	0.91	0.92	0.94	0.96	0.97	1.00	0.80	0.41	0.39	0.37	0.34	0.29	0.27
Friday	0.24	0.23	0.22	0.22	0.22	0.24	0.27	0.34	0.83	0.99	0.93	0.91	0.92	0.94	0.96	0.97	1.00	0.80	0.41	0.39	0.37	0.34	0.29	0.27
Saturday	0.28	0.27	0.26	0.26	0.26	0.27	0.28	0.32	0.43	0.41	0.40	0.41	0.41	0.42	0.42	0.41	0.40	0.37	0.40	0.39	0.38	0.36	0.32	0.30
Sunday	0.28	0.27	0.26	0.26	0.26	0.27	0.28	0.32	0.43	0.41	0.40	0.41	0.41	0.42	0.42	0.41	0.40	0.37	0.40	0.39	0.38	0.36	0.32	0.30

DEMAND-SIDE INDUSTRIAL AND CONTRACT INDUSTRIAL JULY SHAPE

Hour Ending	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Monday	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.00	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Tuesday	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.00	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Wednesday	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.00	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Thursday	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.00	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Friday	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.00	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Saturday	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.00	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Sunday	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.00	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.75	0.75	0.75	0.75	0.75	0.75	0.75

Attachment C - Model Specifications

1993 Residential Model

1993 Commercial Model

1993 Industrial Model

1993 REC Model

1993 Loss Model

1993 Energy Normalizations

1993 Energy Equations

1993 Peak Equations/Seasonal Peak Models

1993 RESIDENTIAL MODEL

$$\ln (MWh/pop)_t = 1.1580 + .053687 \ln (\% HS * HDD)_t$$
$$(11.1) \quad (7.93)$$

$$+.081285 \ln (Y/ p500 KWh)_t$$
$$(9.83)$$

$$+.8515558 * E [\ln (MWh/pop)_{t-1}]$$
$$(58.8)$$

Adjusted R^2 = .99810

SE = 0.302%

DF = 34

DW = 1.44

Historical Data from 1952-1989

Where:

$\ln (MWh/pop)_t$ = Natural log per capita residential sales

$\ln (\% HS * HDD)_t$ = Natural log of Heating Degree Days times the electric space heat saturation

Y = Real per capita non-farm disposable income in year t

p500 KWh = Real price of a monthly bill with usage of 500 KWh

$E (\ln (MWh/pop)_{t-1})$ = First order non-stochastic difference equation

Shortrun E_p = $\frac{dQ}{dP} \times \frac{P}{Q} = -.081285$

Long-run E_p = $\frac{\text{Shortrun } E_p}{1 - \sum (\text{Diff Eq. Coeff.})} = -.54759$

t-ratios from the equations are reported in parenthesis below the parameter estimates

1993 COMMERCIAL MODEL

$$\ln (MWh/pop)_t = 1.1391 + .11769 \ln (HDD)_t + .10804 \ln (Y/p2400)_{t-1} + 1.5289 * E [\ln(MWh/pop)_{t-1}] - .65523 * E [\ln (MWh/pop)_{t-2}]$$

(5.27) (2.40) (5.08) (11.29) (-5.49)

Adjusted R^2	=	.99459
SE	=	.214%
DF		14
DW	=	1.899

Historical Data from 1972-1991

Where:

ln (MWh/pop)	=	Natural log per capita commercial sales
ln (HDD)	=	Natural log of Heating Degree Days
Y	=	Per capita non-farm disposable income
p2400	=	Price 2400 KWh
t	=	Current year
E [ln $(MWh/pop)_{t-1}$]	=	First order non-stochastic difference equation
E [ln $(MWh/pop)_{t-2}$]	=	Second order non-stochastic difference equation
Shortrun E_p	=	-.10804
Longrun E_p	=	-.85522

t-ratios from the equations are reported in parenthesis below the parameter estimates

1993 INDUSTRIAL MODEL

$$\text{MWh Sales}_t = \underset{(2.67)}{316{,}000} + \underset{(1.54)}{12{,}580} * (\text{Trend}) + \underset{(2.28)}{348{,}020} * \text{IPI}_t$$

$$\underset{(-1.67)}{-6.585} * (\text{p } 500{,}000 \text{ KWh/WPI})_t$$

$$\underset{(-2.04)}{-126{,}680} * (\text{Fuels PPI/WPI})_t$$

Adjusted R^2 = 0.96490

SE = 5.117%

DF = 23

DW = 1.823

Historical Data from 1962-1990

Where:

Trend	=	Time in years
p500,000 KWh	=	The price of a monthly bill with usage of 500,000 KWh This price is deflated with the IPD
IPI	=	Industrial Price Index as supplied by DRI
WPI	=	Wholesale Price Index for industrial commodities as supplied by DRI
Fuels PPI	=	Fuels Producer Price Index as supplied by DRI
E_p	=	-.21402

t-ratios from the equations are reported in parenthesis below the parameter estimates.

1993 REC
MODEL

$$Sales_t = 0.22111\ (.75R + .25\ C)_t + 0.40640\ [AR(1)]$$
$$(90.4) \qquad\qquad (2.04)$$

Adjusted R^2 = 0.98102

SE = 3.2%

DF = 19

DW = 1.77

Historical Data from 1970-1990

Where:

Sales	=	REC in MWh
t	=	Time in years
R	=	MPC's Residential Sales in MWh
C	=	MPC's Commercial Sales in MWh
AR(1)	=	First order auto regressive error term

t-ratios from the equations are reported in parenthesis below the parameter estimates.

1993 LOSS MODEL

$$Load_t = \underset{(275.6)}{1.1343} * Sales_t - \underset{(4.85)}{139730} * Trans.Up_t + \underset{(2.68)}{0.23443\ E\text{-}7} * O.S.System^2_t$$

Adjusted R^2 = 0.996

SE = 0.68%

DW = 1.99

Historical Data from 1975 - 1990

Where:

Load	=	Actual load for 1986-90 has been adjusted for CSLMD and CVP firm wheeling losses.
Sales	=	MPC's firm in-state retail and wholesale customers
MWh	=	Load, Sales and Off-System are expressed in MWh.
Trans.Up	=	Captures the step change improvement in transmission losses when the series capacitors on the 500 kV line were put into service in 1986. This parameter is 0's for 1975-85 and 1's for 1986-90.
O.S. System	=	Represents the off-system transactions across MPC's transmission system net of Colstrip 4 sales and is taken from FERC Form 1, Account 447.

t-ratios from the equations are reported in parenthesis below the parameter estimates.

1993
ENERGY NORMALIZATIONS

MONTH	CONSTANT	TREND	LN (RES CUST*DD)	AR ERROR	R^2	SE	DW
JAN		.0234 (11.85)	.334 (258.9)	.46 (2.38)	.97	.51%	1.86
FEB	2.16 (2.41)	.0236 (9.91)	.223 (4.74)	.462 (2.39)	.96	.61%	1.88
MAR	3.17 (2.27)	.0228 (7.89)	.1684 (2.28)	.5129 (2.74)	.94	.69%	1.82
APR	6.30 (283.2)	.023 (13.16)		.472 (2.45)	.96	.47%	1.79
MAY	6.27 (411.63)	.0241 (19.88)			.95	.52%	2.12
JUNE	5.85 (36.57)	.0251 (18.62)	.0282 (2.74)		.96	.55%	1.74
*JULY	5.32 (11.35)	.0282 (19.42)	.0563 (2.02)	-.261 (-1.24)	.97	.62%	1.80
AUG	5.62 (27.39)	.0275 (14.34)	.0407 (3.26)	.421 (2.07)	.97	.49%	1.86
SEPT	6.21 (206.9)	.0298 (12.54)		.261 (1.24)	.93	.79%	1.70
OCT	3.65 (2.64)	.0248 (12.28)	.143 (1.91	.288 (1.38)	.96	.58%	2.00
NOV		.0225 (15.23)	.337 (346.0)		.95	.61%	1.78
DEC	2.45 (2.21)	.0233 (8.45)	.209 (3.62)	.605 (3.48)	.96	.58%	1.73

*JULY Dummy	
-.117	
(-3.45)	1977, 1980 Anaconda Company Strike

1993
ENERGY EQUATIONS

Monthly Equations

MONTH	CONSTANT	LN NORM ANN EGY	LN (RES CUST * DD)	R^2	SE	DW
JAN	-6.8477 (-5.5137)	.89878 (15.86)	.39320 (6.26)	.95	.55%	1.52
JULY	-1.1474 (-2.58)	1.0302 (17.64)	.054147 (2.14)	.96	.55%	1.84

Historical Data from 1971-1991

Remaining Monthly Equations: Trend/Judgemental Shapes

MONTH	ANN EGY
FEB	1.05906
MAR	.98167
APR	.92668
MAY	.92363
JUN	.94297
AUG	.98700
SEP	.92872
OCT	.97556
NOV	1.02851
DEC	1.10998

	Dummy		
JAN	.0024 (.752)	-	1973, 1981 Anaconda Zinc plant down, and economic downturn
JULY	-.86937 (-3.18)	-	1977, 1980 Anaconda Company Strikes

t-ratios form the equations are reported in parenthesis below the parameter estimates.

1993
PEAK EQUATIONS
SEASONAL PEAK MODELS

Winter/Summer Equations

MONTH	CONSTANT	LN NORMAL MTH EGY	LN (RES CUST * DD)	R^2	SE	DW
JAN	-2.5969 (-2.17)	.91331 (11.28)	.17753 (2.41)	.93	.68%	1.43
JULY	-.55449 (-1.06)	.99302 (10.90)	.04943 (2.17)	.92	.84%	1.81

Historical Data from 1971-1991

Monthly Shapes From Seasonal Peaks*

MONTH	SHAPE WINTER PEAK	MONTH	SHAPE SUMMER PEAK
FEB	.9223	MAY	.9206
MAR	.8511	JUN	.9672
APR	.7873	AUG	.9668
OCT	.8331	SEP	.9118
NOV	.9092		
DEC	.9729		

* Shape - Average Ratio 1970 - 1991

	Dummy	
JAN	-.070583 (-2.22)	- 1981, 1983, 1986

t-ratios from the equations are reported in parenthesis below the parameter estimates.

Attachment D - Efficiency E+ Programs

MONTANA POWER COMPANY

EFFICIENCY PLUS PROGRAMS FOR COMMERCIAL CUSTOMERS

EFFICIENCY PLUS Lighting (Commercial)

The EFFICIENCY PLUS Lighting program encourages customers to install efficient interior and exterior lighting in commercial facilities. New and retrofit installations qualify. Rebates are offered for electronic ballasts, fluorescent tubes, compact fluorescent lamps, and high intensity discharge lighting.

Customers are contacted through direct mail and on-site visits. On-site evaluations are available to identify cost effective change-outs.

EFFICIENCY PLUS Motors

The EFFICIENCY PLUS Electric Motor Rebate program promotes the installation of efficient motors, drive systems and controls. An information handbook and free motor efficiency analysis software are available. Customer rebates are provided for efficient motor installations in new or existing facilities. Dealer rebates are offered to encourage the stocking of high efficiency motors. Special application, variable speed drive and motor control systems are evaluated through design studies.

EFFICIENCY PLUS Audits
(Commercial)

This program targets selected larger commercial customers. Through an on-site audit, customers are provided estimates of energy consumption by fuel type and end use.

The audit identifies areas for energy savings and assists the owner in getting information on appropriate retrofits. Outside consultants may assist with complex audits.

EFFICIENCY PLUS Business Partners

EFFICIENCY PLUS BUSINESS PARTNERS provides tools for improving the energy efficiency of new and existing facilities.

For new structures, EFFICIENCY PLUS BUSINESS PARTNERS provides funding for design assistance on new commercial and industrial facilities. This assistance helps the owner acquire resource by providing the owner with the information needed to make sound energy design decisions. Standard recommendations may be offered for less complex facilities.

MPC will contribute toward the cost of optimizing the energy efficiency of facility designs through the use of building performance modeling performed by a qualified consultant.

EFFICIENCY PLUS BUSINESS PARTNERS for existing commercial, industrial, governmental and multi-family residential facilities encourages evaluation of electric demand and energy savings through conservation proposals submitted by architects, engineers, conservation vendors, and customers. Cost effective conservation retrofits are co-funded by MPC.

Projects co-funded include HVAC, lighting and motor retrofits, variable speed drive applications, heat recovery, waste energy generation, refrigeration system retrofit, energy management systems and heat pump systems. MPC's participation is negotiated on the basis of the value of the resource to the company and the customer's economics.

EFFICIENCY PLUS Irrigation

MPC plans to offer a pilot program for irrigation efficiency in 1993.

For more information on Commercial & Industrial programs, Contact Energy Services at your local MPC office or call (406) 723-5421, extension 2351.

EFFICIENCY PLUS

mpc
MONTANA POWER COMPANY

MONTANA POWER COMPANY

EFFICIENCY PLUS PROGRAMS FOR RESIDENTIAL CUSTOMERS

EFFICIENCY PLUS Audits (Residential)

MPC offers the EFFICIENCY PLUS audit to residential customers to increase energy efficiency in the home. Customers who use electricity for home heat and/or electricity for water heat are specifically targeted.

During the audit, MPC installs cost-effective conservation measures that immediately save energy. For instance, in an MPC electric water heat customer home, the auditors will install low flow showerheads, faucet aerators, a water heater wrap, and compact fluorescent lightbulbs. In homes of MPC heating customers, the auditors test for air leaks, install specific air sealing measures, and provide insulation analysis. The auditors also provide customers tips on saving energy and offer information on other EFFICIENCY PLUS Programs.

MPC has a contract with XENERGY to perform the EFFICIENCY PLUS Audit. Customers may qualify for interest-free loans or other incentives for recommended weatherization measures. 5,000 audits will be performed in 1993.

Free Weatherization (Income Qualified)

MPC offers free weatherization to customers whose income is below 150% of the federal poverty guidelines. This program provides energy savings to the customer and frees up energy for MPC to provide to other customers.

MPC fully funds insulation, air sealing, water conservation measures, base electric conservation measures, and some minor home repairs. This program is operated through a contract with Energy Share of Montana and subcontracts with local Human Resource Development Councils.

More than 2,500 customers have been served through this program since 1987.

EFFICIENCY PLUS Electric Water Heaters

The EFFICIENCY PLUS Electric Water Heater program is a new offering in 1993. The water heater is typically the second biggest energy user in the home. This program will provide cash incentives to customers replacing electric water heaters with higher efficiency units. Program kick off is planned for mid-1993.

EFFICIENCY PLUS Lighting (Residential)

The EFFICIENCY PLUS residential lighting program is one in which most MPC electric customers may participate. A compact fluorescent uses about a third as much energy as its incandescent counterpart while producing the same amount of light. Compact fluorescents are especially beneficial in places where lights are used a lot.

In 1992, MPC provided customers compact fluorescents for a small investment by the customer. MPC residential customers could buy as many as five bulbs for $3 each through this program. MPC contracted the program which provided customers a direct mail catalog offering nine bulbs, nine fixtures and adaptors.

The 1992 program was highly successful with more than 40,000 bulbs placed.

In 1993, a program to move the compact fluorescent market into the retail lighting stores will be offered.

Super Good Cents

Super Good Cents encourages the construction of energy efficient electrically heated homes. MPC offers Super Good Cents incentives in areas where natural gas is not available. The program promotes high efficiency, comfort, and emphasizes indoor air quality. Incentives start at $1.25 per square foot for base measures and increase depending on the efficiency features of the home.

EFFICIENCY PLUS Heat Pumps

Ground source heat pumps are highly efficient electric heating and cooling devices which transfer heat from the earth to the home in the winter and move heat from the home to the ground in the summer.

Montana Power offers cash incentives of $2,000 for pre-approved installations for new or existing homes. Incentives are not available where natural gas is offered.

For information on Residential EFFICIENCY PLUS Programs, contact Energy Services at your local MPC office or (406) 723-5421, extension 2351.

Attachment E - MPC 1992 Avoided Costs

MPC
R92 AVOIDED COSTS
MARCH 1992

NOMINAL LEVELIZED RATES
ON-LINE 1993-94

TERM	WINTER ENERGY	SUMMER ENERGY	WINTER CAPACITY	SUMMER CAPACITY	NON-FIRM ENERGY
1	27.34	19.82	7.21	2.79	19.32
2	28.15	20.40	7.37	2.85	20.40
3	29.95	21.71	7.58	2.93	21.66
4	32.76	23.75	7.80	3.01	22.55
5	36.42	26.40	8.00	3.09	23.31
6	39.65	28.74	8.20	3.17	24.01
7	41.05	29.76	8.39	3.24	24.69
8	41.13	29.81	8.57	3.31	25.42
9	40.85	29.61	8.75	3.38	25.96
10	41.02	29.73	8.92	3.45	26.36
11	41.17	29.84	9.09	3.51	26.80
12	41.30	29.94	9.25	3.57	27.25
13	42.68	30.93	9.41	3.64	27.72
14	43.95	31.85	9.58	3.70	28.21
15	44.97	32.59	9.75	3.77	28.70
16	45.97	33.32	9.92	3.83	29.20
17	46.94	34.02	10.09	3.90	29.70
18	47.90	34.72	10.24	3.96	30.20
19	48.85	35.41	10.39	4.02	30.69
20	49.77	36.08	10.53	4.07	31.18
21	50.68	36.74	10.67	4.12	31.66
22	51.57	37.38	10.80	4.18	32.13
23	52.44	38.01	10.93	4.23	32.59
24	53.29	38.63	11.06	4.27	33.04
25	54.12	39.23	11.18	4.32	33.46
26	54.93	39.81	11.29	4.36	33.87
27	55.72	40.38	11.40	4.41	34.26
28	56.46	40.92	11.51	4.45	34.64
29	57.16	41.43	11.61	4.49	35.00
30	57.83	41.92	11.71	4.53	35.34
31	58.46	42.37	11.81	4.56	35.67
32	59.06	42.81	11.90	4.60	35.99
33	59.62	43.22	11.99	4.63	36.29
34	60.16	43.61	12.07	4.67	36.58
35	60.67	43.97	12.15	4.70	36.86
36	61.15	44.32	12.23	4.73	37.12
37	61.61	44.66	12.30	4.76	37.37
38	62.04	44.97	12.37	4.78	37.61
39	62.45	45.27	12.44	4.81	37.84
40	62.84	45.55	12.51	4.83	38.06

MPC
R92 AVOIDED COSTS
MARCH 1992

NOMINAL LEVELIZED RATES
ON-LINE 1994-95

TERM	WINTER ENERGY	SUMMER ENERGY	WINTER CAPACITY	SUMMER CAPACITY	NON-FIRM ENERGY
1	28.23	20.46	6.30	2.83	20.99
2	30.59	22.17	6.44	2.93	22.38
3	34.00	24.65	6.62	3.02	23.20
4	38.26	27.73	6.81	3.10	23.90
5	41.79	30.29	6.99	3.18	24.57
6	43.07	31.22	7.16	3.26	25.23
7	42.83	31.05	7.33	3.33	25.98
8	42.27	30.64	7.49	3.40	26.50
9	42.29	30.65	7.64	3.47	26.87
10	42.31	30.67	7.80	3.53	27.29
11	42.35	30.69	7.94	3.60	27.74
12	43.80	31.74	8.08	3.66	28.21
13	45.13	32.71	8.22	3.73	28.71
14	46.18	33.47	8.37	3.80	29.21
15	47.22	34.23	8.52	3.87	29.73
16	48.23	34.96	8.67	3.94	30.25
17	49.23	35.69	8.81	4.00	30.77
18	50.22	36.40	8.95	4.06	31.28
19	51.19	37.11	9.08	4.12	31.79
20	52.15	37.80	9.20	4.17	32.29
21	53.08	38.47	9.32	4.23	32.79
22	53.99	39.14	9.44	4.28	33.28
23	54.89	39.78	9.55	4.33	33.75
24	55.76	40.42	9.66	4.38	34.20
25	56.62	41.04	9.76	4.43	34.63
26	57.45	41.64	9.87	4.47	35.04
27	58.24	42.21	9.96	4.52	35.44
28	58.98	42.75	10.06	4.56	35.82
29	59.68	43.26	10.15	4.60	36.18
30	60.35	43.75	10.23	4.64	36.53
31	60.99	44.20	10.32	4.68	36.86
32	61.59	44.64	10.40	4.71	37.18
33	62.16	45.05	10.47	4.75	37.49
34	62.70	45.44	10.55	4.78	37.78
35	63.21	45.82	10.62	4.81	38.06
36	63.70	46.17	10.68	4.84	38.33
37	64.16	46.50	10.75	4.87	38.59
38	64.59	46.82	10.81	4.90	38.83
39	65.01	47.12	10.87	4.92	39.07
40	65.40	47.40	10.85	4.95	39.29

MPC
R92 AVOIDED COSTS
MARCH 1992

NOMINAL LEVELIZED RATES
ON-LINE 1995-96

TERM	WINTER ENERGY	SUMMER ENERGY	WINTER CAPACITY	SUMMER CAPACITY	NON-FIRM ENERGY
1	32.24	23.37	7.61	2.94	23.24
2	36.30	26.31	7.86	3.04	23.79
3	41.14	29.82	8.07	3.12	24.37
4	44.83	32.50	8.27	3.20	24.98
5	45.73	33.15	8.47	3.27	25.62
6	44.96	32.59	8.66	3.35	26.37
7	43.96	31.86	8.84	3.42	26.87
8	43.73	31.69	9.02	3.49	27.20
9	43.57	31.58	9.20	3.56	27.61
10	43.46	31.50	9.37	3.62	28.05
11	44.98	32.60	9.54	3.69	28.53
12	46.37	33.61	9.72	3.76	29.04
13	47.45	34.39	9.91	3.83	29.56
14	48.52	35.17	10.09	3.90	30.10
15	49.56	35.92	10.28	3.97	30.64
16	50.60	36.68	10.45	4.04	31.18
17	51.63	37.42	10.61	4.10	31.72
18	52.64	38.15	10.77	4.16	32.25
19	53.63	38.87	10.92	4.22	32.77
20	54.61	39.58	11.07	4.28	33.30
21	55.57	40.28	11.21	4.33	33.81
22	56.51	40.96	11.34	4.38	34.30
23	57.43	41.62	11.48	4.44	34.78
24	58.33	42.28	11.61	4.49	35.23
25	59.20	42.91	11.73	4.53	35.67
26	60.03	43.51	11.85	4.58	36.08
27	60.82	44.08	11.96	4.62	36.49
28	61.56	44.62	12.07	4.67	36.87
29	62.27	45.13	12.18	4.71	37.24
30	62.94	45.62	12.28	4.75	37.60
31	63.57	46.08	12.38	4.79	37.93
32	64.17	46.51	12.48	4.82	38.26
33	64.75	46.93	12.57	4.86	38.57
34	65.29	47.32	12.66	4.89	38.87
35	65.80	47.70	12.74	4.92	39.15
36	66.29	48.05	12.82	4.96	39.43
37	66.76	48.39	12.90	4.98	39.69
38	67.20	48.70	12.97	5.01	39.94
39	67.61	49.01	13.04	5.04	40.17
40	68.01	49.29	13.11	5.07	40.40

MPC
R92 AVOIDED COSTS
MARCH 1992

NOMINAL LEVELIZED RATES
ON-LINE 1996-97

TERM	WINTER ENERGY	SUMMER ENERGY	WINTER CAPACITY	SUMMER CAPACITY	NON-FIRM ENERGY
1	39.47	28.61	7.87	3.04	23.60
2	44.83	32.50	8.06	3.12	24.21
3	48.36	35.05	8.26	3.19	24.85
4	48.46	35.12	8.46	3.27	25.52
5	46.83	33.94	8.65	3.34	26.33
6	45.21	32.77	8.84	3.42	26.82
7	44.66	32.37	9.02	3.49	27.13
8	44.28	32.10	9.20	3.55	27.53
9	44.01	31.90	9.37	3.62	27.98
10	45.61	33.06	9.54	3.69	28.47
11	47.07	34.11	9.73	3.76	29.00
12	48.18	34.92	9.93	3.84	29.54
13	49.28	35.72	10.12	3.91	30.10
14	50.36	36.50	10.31	3.99	30.67
15	51.44	37.28	10.49	4.06	31.24
16	52.50	38.06	10.66	4.12	31.80
17	53.56	38.82	10.82	4.18	32.36
18	54.59	39.57	10.98	4.24	32.91
19	55.61	40.31	11.13	4.30	33.46
20	56.62	41.04	11.28	4.36	34.00
21	57.60	41.75	11.43	4.42	34.52
22	58.56	42.45	11.56	4.47	35.02
23	59.51	43.13	11.70	4.52	35.50
24	60.43	43.80	11.83	4.57	35.96
25	61.30	44.43	11.95	4.62	36.40
26	62.13	45.03	12.08	4.67	36.82
27	62.91	45.60	12.19	4.71	37.23
28	63.65	46.14	12.30	4.76	37.62
29	64.36	46.65	12.41	4.80	37.99
30	65.03	47.13	12.52	4.84	38.35
31	65.66	47.59	12.62	4.88	38.70
32	66.27	48.03	12.71	4.91	39.03
33	66.84	48.45	12.80	4.95	39.34
34	67.39	48.84	12.89	4.98	39.64
35	67.90	49.22	12.98	5.02	39.93
36	68.39	49.57	13.06	5.05	40.21
37	68.86	49.91	13.14	5.08	40.47
38	69.30	50.23	13.21	5.11	40.72
39	69.72	50.53	13.28	5.13	40.96
40	70.12	50.82	13.35	5.16	41.19

MPC
R92 AVOIDED COSTS
MARCH 1992

NOMINAL LEVELIZED RATES
ON-LINE 1997-98

TERM	WINTER ENERGY	SUMMER ENERGY	WINTER CAPACITY	SUMMER CAPACITY	NON-FIRM ENERGY
1	49.09	35.58	7.99	3.09	24.05
2	51.76	37.52	8.20	3.17	24.72
3	50.38	36.52	8.40	3.25	25.42
4	47.55	34.47	8.60	3.32	26.30
5	45.19	32.75	8.79	3.40	26.76
6	44.35	32.15	8.98	3.47	27.02
7	43.78	31.73	9.16	3.54	27.41
8	43.39	31.45	9.33	3.61	27.87
9	45.15	32.73	9.51	3.68	28.37
10	46.73	33.87	9.71	3.75	28.91
11	47.92	34.73	9.92	3.83	29.48
12	49.09	35.58	10.12	3.91	30.06
13	50.23	36.41	10.32	3.99	30.65
14	51.37	37.24	10.50	4.06	31.25
15	52.50	38.06	10.68	4.13	31.84
16	53.62	38.86	10.85	4.19	32.43
17	54.71	39.66	11.01	4.26	33.01
18	55.79	40.44	11.17	4.32	33.58
19	56.85	41.20	11.33	4.38	34.15
20	57.88	41.96	11.48	4.44	34.70
21	58.90	42.70	11.62	4.49	35.22
22	59.90	43.42	11.76	4.55	35.73
23	60.88	44.12	11.90	4.60	36.21
24	61.80	44.79	12.03	4.65	36.67
25	62.67	45.42	12.16	4.70	37.12
26	63.50	46.02	12.28	4.75	37.55
27	64.28	46.59	12.40	4.79	37.96
28	65.03	47.13	12.51	4.84	38.35
29	65.74	47.65	12.62	4.88	38.73
30	66.41	48.13	12.73	4.92	39.10
31	67.05	48.60	12.83	4.96	39.44
32	67.65	49.04	12.93	5.00	39.78
33	68.23	49.45	13.02	5.03	40.10
34	68.78	49.85	13.11	5.07	40.40
35	69.30	50.23	13.19	5.10	40.69
36	69.79	50.58	13.28	5.13	40.97
37	70.26	50.92	13.36	5.16	41.24
38	70.70	51.25	13.43	5.19	41.50
39	71.12	51.55	13.50	5.22	41.74
40	71.52	51.84	13.57	5.25	41.97

MPC
R92 AVOIDED COSTS
MARCH 1992

NOMINAL LEVELIZED RATES
ON-LINE 1998-99

TERM	WINTER ENERGY	SUMMER ENERGY	WINTER CAPACITY	SUMMER CAPACITY	NON-FIRM ENERGY
1	52.88	38.33	8.13	3.14	24.61
2	49.42	35.82	8.35	3.23	25.33
3	45.33	32.86	8.55	3.30	26.30
4	42.44	30.76	8.74	3.38	26.71
5	41.60	30.16	8.93	3.45	26.89
6	41.08	29.77	9.12	3.52	27.25
7	40.74	29.53	9.29	3.59	27.71
8	42.88	31.08	9.48	3.66	28.23
9	44.74	32.43	9.68	3.74	28.79
10	46.11	33.42	9.90	3.83	29.38
11	47.43	34.38	10.11	3.91	29.99
12	48.71	35.30	10.32	3.99	30.61
13	49.97	36.22	10.51	4.06	31.23
14	51.21	37.12	10.69	4.13	31.85
15	52.42	37.99	10.87	4.20	32.47
16	53.61	38.85	11.04	4.27	33.08
17	54.77	39.70	11.21	4.33	33.68
18	55.91	40.52	11.37	4.39	34.28
19	57.03	41.33	11.52	4.45	34.86
20	58.12	42.13	11.68	4.51	35.41
21	59.19	42.90	11.82	4.57	35.94
22	60.23	43.66	11.96	4.62	36.44
23	61.22	44.37	12.10	4.68	36.93
24	62.15	45.05	12.24	4.73	37.40
25	63.03	45.69	12.36	4.78	37.85
26	63.87	46.29	12.49	4.83	38.29
27	64.66	46.87	12.61	4.87	38.70
28	65.42	47.41	12.72	4.92	39.10
29	66.13	47.93	12.83	4.96	39.48
30	66.81	48.43	12.94	5.00	39.85
31	67.46	48.89	13.04	5.04	40.20
32	68.07	49.34	13.14	5.08	40.54
33	68.65	49.76	13.24	5.12	40.87
34	69.21	50.16	13.33	5.15	41.17
35	69.73	50.54	13.42	5.19	41.47
36	70.23	50.90	13.50	5.22	41.75
37	70.70	51.25	13.58	5.25	42.03
38	71.15	51.57	13.66	5.28	42.28
39	71.58	51.88	13.73	5.31	42.53
40	71.98	52.17	13.80	5.33	42.77

MPC
R92 AVOIDED COSTS
MARCH 1992

NOMINAL LEVELIZED RATES
ON-LINE 1999-00

TERM	WINTER ENERGY	SUMMER ENERGY	WINTER CAPACITY	SUMMER CAPACITY	NON-FIRM ENERGY
1	43.98	31.88	8.29	3.20	25.23
2	39.49	28.62	8.48	3.28	26.34
3	36.83	26.69	8.68	3.35	26.61
4	36.63	26.55	8.87	3.43	26.67
5	36.55	26.49	9.06	3.50	27.00
6	36.54	26.48	9.24	3.57	27.46
7	39.33	28.51	9.43	3.64	27.99
8	41.64	30.18	9.64	3.73	28.58
9	43.31	31.40	9.87	3.81	29.20
10	44.88	32.53	10.09	3.90	29.84
11	46.36	33.60	10.30	3.98	30.49
12	47.79	34.64	10.50	4.06	31.15
13	49.18	35.65	10.69	4.13	31.80
14	50.53	36.63	10.87	4.20	32.44
15	51.84	37.58	11.05	4.27	33.08
16	53.12	38.50	11.22	4.34	33.72
17	54.36	39.40	11.39	4.40	34.35
18	55.57	40.28	11.55	4.47	34.95
19	56.76	41.14	11.71	4.53	35.53
20	57.91	41.98	11.87	4.59	36.08
21	59.03	42.79	12.01	4.64	36.62
22	60.09	43.55	12.16	4.70	37.13
23	61.09	44.28	12.30	4.75	37.62
24	62.03	44.96	12.43	4.81	38.09
25	62.93	45.61	12.56	4.86	38.55
26	63.78	46.23	12.69	4.90	38.99
27	64.58	46.81	12.81	4.95	39.41
28	65.35	47.36	12.92	5.00	39.81
29	66.07	47.89	13.04	5.04	40.20
30	66.76	48.39	13.15	5.08	40.57
31	67.41	48.86	13.25	5.12	40.93
32	68.03	49.31	13.35	5.16	41.27
33	68.62	49.74	13.45	5.20	41.59
34	69.18	50.15	13.54	5.23	41.91
35	69.72	50.53	13.63	5.27	42.21
36	70.22	50.90	13.71	5.30	42.49
37	70.70	51.24	13.79	5.33	42.77
38	71.15	51.57	13.87	5.36	43.03
39	71.58	51.89	13.94	5.39	43.28
40	71.99	52.18	14.01	5.42	43.52

MPC
R92 AVOIDED COSTS
MARCH 1992

NOMINAL LEVELIZED RATES
ON-LINE 2000-01

TERM	WINTER ENERGY	SUMMER ENERGY	WINTER CAPACITY	SUMMER CAPACITY	NON-FIRM ENERGY
1	33.21	24.07	8.37	3.24	26.53
2	31.42	22.77	8.57	3.31	26.39
3	32.35	23.45	8.77	3.39	26.23
4	32.86	23.82	8.96	3.46	26.54
5	33.22	24.08	9.14	3.53	27.01
6	36.79	26.66	9.33	3.61	27.58
7	39.60	28.70	9.56	3.69	28.19
8	41.56	30.13	9.79	3.79	28.85
9	43.35	31.42	10.02	3.87	29.53
10	45.01	32.63	10.25	3.96	30.21
11	46.60	33.77	10.46	4.04	30.90
12	48.12	34.88	10.65	4.12	31.59
13	49.58	35.94	10.84	4.19	32.26
14	50.99	36.96	11.02	4.26	32.94
15	52.36	37.95	11.20	4.33	33.60
16	53.69	38.92	11.37	4.40	34.26
17	54.99	39.85	11.54	4.46	34.89
18	56.25	40.77	11.71	4.52	35.50
19	57.47	41.66	11.87	4.59	36.08
20	58.66	42.52	12.02	4.65	36.64
21	59.78	43.33	12.17	4.70	37.17
22	60.84	44.10	12.31	4.76	37.69
23	61.84	44.82	12.45	4.81	38.19
24	62.79	45.51	12.59	4.87	38.66
25	63.68	46.16	12.72	4.92	39.12
26	64.54	46.78	12.85	4.97	39.56
27	65.34	47.36	12.97	5.01	39.99
28	66.11	47.92	13.09	5.06	40.39
29	66.83	48.44	13.20	5.10	40.78
30	67.53	48.94	13.31	5.15	41.16
31	68.18	49.42	13.42	5.19	41.52
32	68.80	49.87	13.52	5.22	41.86
33	69.40	50.30	13.61	5.26	42.19
34	69.96	50.71	13.71	5.30	42.51
35	70.49	51.09	13.80	5.33	42.81
36	71.00	51.46	13.88	5.37	43.10
37	71.48	51.81	13.96	5.40	43.38
38	71.93	52.14	14.04	5.43	43.64
39	72.37	52.45	14.12	5.46	43.89
40	72.78	52.75	14.19	5.48	44.14

MPC
R92 AVOIDED COSTS
MARCH 1992

NOMINAL LEVELIZED RATES
ON-LINE 2001-02

TERM	WINTER ENERGY	SUMMER ENERGY	WINTER CAPACITY	SUMMER CAPACITY	NON-FIRM ENERGY
1	28.29	20.51	8.46	3.27	25.23
2	30.63	22.20	8.66	3.35	25.06
3	31.46	22.80	8.85	3.42	25.51
4	31.94	23.15	9.03	3.49	26.12
5	36.31	26.32	9.22	3.57	26.79
6	39.54	28.66	9.46	3.66	27.49
7	41.68	30.21	9.71	3.75	28.22
8	43.60	31.60	9.95	3.84	28.95
9	45.35	32.87	10.19	3.94	29.70
10	47.01	34.08	10.40	4.02	30.43
11	48.60	35.23	10.60	4.10	31.16
12	50.13	36.33	10.79	4.17	31.88
13	51.59	37.40	10.98	4.24	32.59
14	53.02	38.43	11.16	4.32	33.29
15	54.40	39.43	11.34	4.38	33.99
16	55.75	40.41	11.52	4.45	34.65
17	57.06	41.36	11.69	4.52	35.29
18	58.34	42.28	11.85	4.58	35.90
19	59.58	43.18	12.01	4.64	36.49
20	60.74	44.03	12.17	4.70	37.05
21	61.84	44.83	12.32	4.76	37.59
22	62.88	45.58	12.46	4.82	38.11
23	63.87	46.29	12.61	4.87	38.61
24	64.80	46.97	12.74	4.93	39.09
25	65.69	47.61	12.87	4.98	39.55
26	66.53	48.22	13.00	5.03	40.00
27	67.33	48.80	13.12	5.07	40.43
28	68.09	49.35	13.24	5.12	40.84
29	68.81	49.88	13.36	5.16	41.23
30	69.50	50.37	13.47	5.21	41.61
31	70.15	50.85	13.57	5.25	41.97
32	70.77	51.29	13.68	5.29	42.32
33	71.36	51.72	13.77	5.32	42.65
34	71.92	52.13	13.87	5.36	42.97
35	72.45	52.51	13.96	5.39	43.28
36	72.95	52.88	14.04	5.43	43.57
37	73.43	53.23	14.13	5.46	43.85
38	73.89	53.56	14.20	5.49	44.11
39	74.32	53.87	14.28	5.52	44.37
40	74.73	54.17	14.35	5.55	44.61

MPC
R92 AVOIDED COSTS
MARCH 1992

NOMINAL LEVELIZED RATES
ON-LINE 2002-03

TERM	WINTER ENERGY	SUMMER ENERGY	WINTER CAPACITY	SUMMER CAPACITY	NON-FIRM ENERGY
1	31.92	23.14	8.53	3.30	23.89
2	32.01	23.20	8.72	3.37	24.67
3	32.13	23.29	8.89	3.44	25.45
4	37.37	27.09	9.10	3.52	26.22
5	40.92	29.66	9.35	3.61	27.00
6	43.10	31.24	9.61	3.72	27.79
7	45.02	32.64	9.86	3.81	28.58
8	46.77	33.90	10.11	3.91	29.37
9	48.44	35.11	10.33	3.99	30.15
10	50.03	36.26	10.53	4.07	30.91
11	51.57	37.38	10.73	4.15	31.66
12	53.05	38.45	10.93	4.22	32.41
13	54.49	39.50	11.11	4.30	33.14
14	55.89	40.51	11.30	4.37	33.87
15	57.26	41.51	11.48	4.44	34.56
16	58.60	42.48	11.65	4.50	35.23
17	59.92	43.43	11.82	4.57	35.86
18	61.19	44.35	11.99	4.63	36.47
19	62.39	45.22	12.15	4.70	37.06
20	63.52	46.04	12.31	4.76	37.62
21	64.59	46.81	12.46	4.82	38.17
22	65.60	47.55	12.60	4.87	38.69
23	66.56	48.25	12.75	4.93	39.19
24	67.48	48.91	12.88	4.98	39.67
25	68.35	49.54	13.02	5.03	40.14
26	69.17	50.14	13.15	5.08	40.58
27	69.96	50.71	13.27	5.13	41.01
28	70.71	51.25	13.39	5.18	41.43
29	71.42	51.76	13.50	5.22	41.82
30	72.09	52.26	13.62	5.26	42.20
31	72.74	52.72	13.72	5.30	42.57
32	73.35	53.17	13.82	5.34	42.92
33	73.93	53.59	13.92	5.38	43.25
34	74.49	53.99	14.02	5.42	43.57
35	75.02	54.37	14.11	5.45	43.88
36	75.52	54.74	14.19	5.49	44.17
37	76.00	55.08	14.28	5.52	44.45
38	76.45	55.41	14.36	5.55	44.72
39	76.88	55.72	14.43	5.58	44.98
40	77.29	56.02	14.51	5.61	45.23

MPC
R92 AVOIDED COSTS
MARCH 1992

NOMINAL LEVELIZED RATES
ON-LINE 2003-04

TERM	WINTER ENERGY	SUMMER ENERGY	WINTER CAPACITY	SUMMER CAPACITY	NON-FIRM ENERGY
1	30.84	22.35	8.57	3.31	24.54
2	30.98	22.45	8.75	3.38	25.33
3	38.06	27.58	8.97	3.47	26.11
4	42.11	30.52	9.24	3.57	26.90
5	44.33	32.13	9.52	3.68	27.71
6	46.25	33.52	9.78	3.78	28.53
7	47.98	34.78	10.04	3.88	29.34
8	49.64	35.98	10.26	3.97	30.14
9	51.23	37.13	10.47	4.05	30.92
10	52.77	38.25	10.67	4.12	31.70
11	54.26	39.33	10.87	4.20	32.47
12	55.72	40.39	11.06	4.28	33.22
13	57.14	41.42	11.25	4.35	33.97
14	58.54	42.43	11.44	4.42	34.69
15	59.91	43.42	11.62	4.49	35.37
16	61.25	44.39	11.79	4.56	36.03
17	62.55	45.34	11.96	4.62	36.66
18	63.78	46.23	12.13	4.69	37.27
19	64.94	47.07	12.29	4.75	37.85
20	66.04	47.87	12.45	4.81	38.41
21	67.09	48.63	12.60	4.87	38.95
22	68.08	49.34	12.75	4.93	39.47
23	69.02	50.03	12.89	4.98	39.97
24	69.92	50.68	13.03	5.04	40.46
25	70.77	51.29	13.16	5.09	40.92
26	71.58	51.88	13.29	5.14	41.37
27	72.36	52.45	13.42	5.19	41.80
28	73.09	52.98	13.54	5.23	42.21
29	73.80	53.49	13.65	5.28	42.61
30	74.47	53.97	13.77	5.32	42.99
31	75.10	54.44	13.87	5.36	43.36
32	75.71	54.88	13.98	5.40	43.71
33	76.29	55.30	14.07	5.44	44.05
34	76.84	55.70	14.17	5.48	44.37
35	77.36	56.08	14.26	5.51	44.68
36	77.86	56.44	14.35	5.55	44.97
37	78.34	56.78	14.43	5.58	45.25
38	78.79	57.11	14.51	5.61	45.52
39	79.22	57.42	14.59	5.64	45.78
40	79.62	57.71	14.66	5.67	46.03

MPC
R92 AVOIDED COSTS
MARCH 1992

NOMINAL LEVELIZED RATES
ON-LINE 2004-05

TERM	WINTER ENERGY	SUMMER ENERGY	WINTER CAPACITY	SUMMER CAPACITY	NON-FIRM ENERGY
1	29.90	21.67	8.59	3.32	25.17
2	40.62	29.44	8.84	3.42	25.96
3	44.90	32.55	9.14	3.53	26.77
4	46.78	33.91	9.44	3.65	27.61
5	48.45	35.12	9.71	3.75	28.45
6	50.01	36.25	9.98	3.86	29.28
7	51.54	37.36	10.20	3.94	30.10
8	53.05	38.45	10.41	4.03	30.91
9	54.53	39.53	10.62	4.10	31.70
10	55.98	40.58	10.82	4.18	32.49
11	57.42	41.62	11.02	4.26	33.27
12	58.83	42.64	11.21	4.33	34.05
13	60.22	43.65	11.40	4.41	34.78
14	61.60	44.65	11.58	4.48	35.49
15	62.95	45.63	11.76	4.55	36.17
16	64.27	46.59	11.94	4.61	36.81
17	65.52	47.49	12.11	4.68	37.44
18	66.70	48.35	12.28	4.75	38.04
19	67.82	49.16	12.44	4.81	38.62
20	68.88	49.93	12.60	4.87	39.18
21	69.89	50.66	12.75	4.93	39.72
22	70.86	51.36	12.90	4.99	40.24
23	71.78	52.02	13.04	5.04	40.74
24	72.65	52.66	13.18	5.10	41.23
25	73.49	53.27	13.32	5.15	41.69
26	74.28	53.84	13.45	5.20	42.14
27	75.05	54.39	13.57	5.25	42.57
28	75.77	54.92	13.69	5.29	42.99
29	76.46	55.42	13.81	5.34	43.38
30	77.13	55.90	13.92	5.38	43.77
31	77.76	56.36	14.03	5.42	44.13
32	78.36	56.79	14.13	5.46	44.49
33	78.93	57.21	14.23	5.50	44.82
34	79.47	57.60	14.33	5.54	45.15
35	79.99	57.98	14.42	5.57	45.46
36	80.49	58.34	14.51	5.61	45.76
37	80.96	58.68	14.60	5.64	46.04
38	81.41	59.01	14.68	5.67	46.31
39	81.83	59.31	14.75	5.70	46.57
40	82.24	59.61	14.83	5.73	46.82

BCAVC

MPC
R92 AVOIDED COSTS
MARCH 1992

MCOC = 11.23%

NOMINAL ANNUAL RATES

YEAR BEGIN 7	WINTER ENERGY	SUMMER ENERGY	WINTER CAPACITY	SUMMER CAPACITY	NON-FIRM ENERGY	TERM	NOMINAL APVF	NOMINAL UCRF	DRI GNP DEFLATOR	
									1.028	1.028
1993	28.87	20.92	7.61	2.94	20.4	1	0.899	1.112	1.027	1.056
1994	30.67	22.23	7.97	3.08	22.8	2	0.808	0.586	1.029	1.086
1995	36.07	26.15	8.52	3.29	26.0	3	0.727	0.411	1.030	1.119
1996	45.66	33.10	9.11	3.52	27.3	4	0.653	0.324	1.034	1.157
1997	58.78	42.61	9.57	3.70	28.8	5	0.587	0.272	1.035	1.198
1998	65.54	47.51	10.08	3.90	30.5	6	0.528	0.238	1.035	1.239
1999	56.47	40.93	10.65	4.11	32.4	7	0.475	0.214	1.036	1.284
2000	44.30	32.11	11.17	4.32	35.4	8	0.427	0.196	1.039	1.334
2001	39.25	28.45	11.73	4.53	35.0	9	0.384	0.182	1.040	1.387
2002	46.10	33.42	12.32	4.76	34.5	10	0.345	0.171	1.041	1.444
2003	46.37	33.61	12.89	4.98	36.9	11	0.310	0.163	1.041	1.504
2004	46.81	33.93	13.45	5.20	39.4	12	0.279	0.156	1.041	1.565
2005	82.23	59.60	14.26	5.51	42.0	13	0.251	0.150		
2006	86.04	62.36	15.41	5.96	44.9	14	0.225	0.145		
2007	84.18	61.01	16.51	6.38	48.1	15	0.203	0.141		
2008	89.60	64.95	17.43	6.74	51.4	16	0.182	0.137		
2009	95.22	69.02	18.52	7.16	54.9	17	0.164	0.134		
2010	101.93	73.88	19.14	7.40	58.5	18	0.147	0.132		
2011	108.93	78.95	19.90	7.69	62.2	19	0.132	0.129		
2012	116.13	84.17	20.90	8.08	66.2	20	0.119	0.127		
2013	123.82	89.75	21.94	8.48	70.5	21	0.107	0.126		
2014	132.02	95.69	23.04	8.91	75.1	22	0.096	0.124		
2015	140.77	102.04	24.19	9.35	80.0	23	0.086	0.123		
2016	150.12	108.81	25.40	9.82	84.0	24	0.078	0.122		
2017	160.09	116.04	26.67	10.31	88.2	25	0.070	0.121		
2018	170.73	123.75	28.01	10.83	92.6	26	0.063	0.120		
2019	181.30	131.41	29.41	11.37	97.2	27	0.056	0.119		
2020	189.37	137.26	30.88	11.93	102.1	28	0.051	0.118		
2021	197.81	143.38	32.42	12.53	107.2	29	0.046	0.118		
2022	206.64	149.78	34.04	13.16	112.6	30	0.041	0.117		
2023	215.86	156.46	35.74	13.82	118.2	31	0.037	0.117		
2024	225.51	163.46	37.53	14.51	124.1	32	0.033	0.116		
2025	235.60	170.77	39.41	15.23	130.3	33	0.030	0.116		
2026	246.15	178.41	41.38	15.99	136.8	34	0.027	0.115		
2027	257.17	186.41	43.45	16.79	143.7	35	0.024	0.115		
2028	268.71	194.77	45.62	17.63	150.9	36	0.022	0.115		
2029	280.77	203.51	47.90	18.51	158.4	37	0.019	0.115		
2030	293.38	212.65	50.30	19.44	166.3	38	0.018	0.114		
2031	306.57	222.21	52.81	20.41	174.6	39	0.016	0.114		
2032	320.37	232.21	55.45	21.43	183.4	40	0.014	0.114		
2033	334.80	242.67	58.22	22.50	192.5					
2034	349.89	253.61	61.13	23.63	202.2					
2035	365.67	265.05	64.19	24.81	212.3					
2036	382.18	277.01	67.40	26.05	222.9					
2037	399.45	289.53	70.77	27.35	234.0					
2038	417.52	302.63	74.31	28.72	245.7					
2039	436.42	316.33	78.02	30.16	258.0					
2040	456.19	330.66	81.93	31.67	270.9					
2041	476.87	345.65	86.02	33.25	284.5					
2042	498.51	361.33	90.32	34.91	298.7					
2043	521.15	377.74	94.84	36.66	313.6					
2044	544.84	394.91	99.58	38.49	329.3					
2045	569.62	412.87	104.56	40.42	345.8					
2046	595.55	431.67	109.79	42.44	363.0					
2047	622.69	451.34	115.28	44.56	381.2					
2048	651.08	471.92	121.04	46.79	400.3					
2049	680.79	493.45	127.09	49.12	420.3					
2050	711.88	515.99	133.45	51.58	441.3					

Seasonally differentiated values from WP "1992 Resource plan avoided costs February 1992" attached.
Energy: *1.2243=wnt & .8874=smr (MPSC Order 5484r)
Capacity: *.564/4=wnt & *.436/8=smr (MPSC Order 5484r)

THE MONTANA POWER COMPANY
AVOIDED COSTS FOR:
1992 RESOURCE PLAN
FEBRUARY 1992

PROMOD/CER RATE DATA

YEAR BEGIN 7	(1) BASE CASE TOTAL REV REQ	(2) CHANGE CASE TOTAL REV REQ	(3) 20MW QF AVOIDED REV REQ	(4) CAPACITY RATE $/KW/YR	(5) ENERGY RATE MIL/KWH
1992	NA	NA	NA	52.8	21.96
1993	NA	NA	NA	54.0	23.58
1994	NA	NA	NA	56.5	25.05
1995	NA	NA	NA	60.4	29.47
1996	NA	NA	NA	64.6	37.30
1997	NA	NA	NA	67.9	48.01
1998	NA	NA	NA	71.5	53.53
1999	NA	NA	NA	75.5	46.12
2000	NA	NA	NA	79.2	36.18
2001	NA	NA	NA	83.2	32.06
2002	NA	NA	NA	87.4	37.66
2003	NA	NA	NA	91.4	37.88
2004	NA	NA	NA	95.4	38.23
2005	NA	NA	NA	101.1	67.16
2006	NA	NA	NA	109.3	70.27
2007	NA	NA	NA	115.5	52.63
2008	NA	NA	NA	120.4	55.41
2009	NA	NA	NA	127.5	58.00
2010	NA	NA	NA	133.6	60.95
2011	NA	NA	NA	138.4	64.27
2012	NA	NA	NA	144.7	67.59
2013	NA	NA	NA	151.9	70.97
2014	NA	NA	NA	159.5	74.52
2015	NA	NA	NA	167.5	78.24
2016	NA	NA	NA	175.9	82.16
2017	NA	NA	NA	184.7	86.26
2018	NA	NA	NA	193.9	90.58
2019	NA	NA	NA	203.6	95.11
2020	NA	NA	NA	213.8	99.86
2021	NA	NA	NA	224.5	104.85
2022	NA	NA	NA	235.7	110.10
2023	NA	NA	NA	247.5	115.60
2024	NA	NA	NA	259.8	121.38
2025	NA	NA	NA	272.8	127.45
2026	NA	NA	NA	286.5	133.82

(1) – (5): See attached worksheet "CER DATA WORKSHEET" for '92 – '06.
See attached worksheet "COMBINED CYCLE VS COAL COSTS" for '07 – '26.

cerdta

MONTANA POWER COMPANY
R92 RESOURCE PLAN –AVOIDED COSTS
CER DATA WORKSHEET

	year	base case	change case	difference	total $/mwh	bpa nr capacity	residual energy	rate year begin 7	avoided cost rates capacity	energy
1	1992	118313	113635	4678	26.70	52.8	20.67	1992	52.8	21.96
2	1993	136984	131854	5130	29.28	52.8	23.25	1993	54.0	23.58
3	1994	152677	147387	5290	30.19	55.13	23.90	1994	56.5	25.05
4	1995	160729	154981	5748	32.81	57.92	26.20	1995	60.4	29.47
5	1996	183795	176802	6993	39.91	62.89	32.74	1996	64.6	37.30
6	1997	217697	209037	8660	49.43	66.31	41.86	1997	67.9	48.01
7	1998	238816	227935	10881	62.11	69.57	54.16	1998	71.5	53.53
8	1999	255419	244681	10738	61.29	73.45	52.91	1999	75.5	46.12
9	2000	277519	269077	8442	48.18	77.49	39.34	2000	79.2	36.18
10	2001	297317	289912	7405	42.27	80.9	33.03	2001	83.2	32.06
11	2002	322217	315061	7156	40.84	85.41	31.09	2002	87.4	37.66
12	2003	342526	332990	9536	54.43	89.45	44.22	2003	91.4	37.87
13	2004	367622	360231	7391	42.19	93.33	31.53	2004	95.4	38.23
14	2005	406456	396634	9822	56.06	97.52	44.93	2005	101.1	67.16
15	2006	440086	422330	17756	101.35	104.67	89.40	2006	109.3	70.27

MPC
COMBINED CYCLE VS COAL COSTS

		COMBINED CYCLE UNITS			PULVERIZED COAL UNIT					
		FIXED COSTS @4.0%	VARIABLE COSTS @5.5%	TOTAL COSTS @75%LF	FIXED COSTS @4.0%	VARIABLE COSTS @3.3%	TOTAL COSTS @75%LF	LOWEST COST	BPA NR CAPACITY COST	RESIDUAL ENERGY VALUE
1	1991	95.76	18.55	33.13	197.00	22.52	52.50	33.13	52.8	25.09
2	1992	99.59	19.57	34.73	204.88	23.26	54.45	34.73	52.8	26.69
3	1993	103.57	20.65	36.41	213.08	24.03	56.48	36.41	54.0	28.19
4	1994	107.72	21.78	38.18	221.60	24.82	58.55	38.18	56.5	29.58
5	1995	112.03	22.98	40.03	230.46	25.64	60.72	40.03	60.4	30.84
6	1996	118.51	24.24	41.98	239.68	26.49	62.97	41.98	64.6	32.14
7	1997	121.17	25.58	44.02	249.27	27.36	65.30	44.02	67.9	33.69
8	1998	126.01	26.98	46.16	259.24	28.27	67.72	46.16	71.5	35.28
9	1999	131.05	28.47	48.42	269.61	29.20	70.24	48.42	75.5	36.92
10	2000	136.30	30.03	50.78	280.39	30.16	72.84	50.78	79.2	38.72
11	2001	141.75	31.69	53.26	291.61	31.16	75.54	53.26	83.2	40.60
12	2002	147.42	33.43	55.87	303.27	32.19	78.35	55.87	87.4	42.56
13	2003	153.31	35.27	58.60	315.40	33.25	81.26	58.60	91.4	44.69
14	2004	159.45	37.21	61.48	328.02	34.35	84.27	61.48	95.4	46.96
15	2005	165.83	39.25	64.49	341.14	35.48	87.40	64.49	101.1	49.11
16	2006	172.46	41.41	67.66	354.79	36.65	90.65	67.66	109.3	51.03
17	2007	179.36	43.69	70.99	368.98	37.86	94.02	70.99	115.5	52.63
18	2008	186.53	46.09	74.48	383.74	39.11	97.52	74.48	120.4	55.41
19	2009	193.99	48.63	78.16	399.09	40.40	101.14	78.16	127.5	58.00
20	2010	201.75	51.30	82.01	415.05	41.73	104.91	82.01	133.6	60.95
21	2011	209.82	54.12	86.06	431.65	43.11	108.81	86.06	138.4	64.27
22	2012	218.21	57.10	90.32	448.92	44.53	112.86	90.32	144.7	67.59
23	2013	226.94	60.24	94.78	466.87	46.00	117.06	94.78	151.9	70.97
24	2014	236.02	63.56	99.48	485.55	47.52	121.42	99.48	159.5	74.52
25	2015	245.46	67.05	104.41	504.97	49.09	125.95	104.41	167.5	78.24
26	2016	255.28	70.74	109.59	525.17	50.71	130.64	109.59	175.9	52.16
27	2017	265.49	74.63	115.04	546.18	52.38	135.51	115.04	184.7	86.26
28	2018	276.11	78.73	120.76	568.02	54.11	140.57	120.76	193.9	90.58
29	2019	287.16	83.06	126.77	590.74	55.90	145.81	126.77	203.6	95.11
30	2020	298.64	87.63	133.09	614.37	57.74	151.25	133.09	213.8	99.86
31	2021	310.59	92.45	139.73	638.95	59.65	156.90	139.73	224.5	104.85
32	2022	323.01	97.54	146.70	664.51	61.61	162.76	146.70	235.7	110.10
33	2023	335.93	102.90	154.03	691.09	63.65	168.84	154.03	247.5	115.60
34	2024	349.37	108.56	161.74	718.73	65.75	175.14	161.74	259.9	121.38
35	2025	363.34	114.53	169.84	747.48	67.92	181.69	169.84	272.9	127.45
36	2026	377.88	120.83	178.35	777.38	70.16	188.48	178.35	286.5	133.82
37	2027	392.99	127.48	187.29	808.47	72.47	195.53	187.29	300.8	141.51
38	2028	408.71	134.49	196.70	840.81	74.87	202.84	196.70	315.9	148.62
39	2029	425.06	141.89	206.58	874.45	77.34	210.43	206.58	331.7	156.10
40	2030	442.06	149.69	216.97	909.42	79.89	218.31	216.97	348.2	163.97

see attached WP "MPC Combined Cycle Costs" for 1st year values.

MPC
COMBINED CYCLE COSTS
1st & 2nd E UNITS

REVENUE REQUIREMENTS (1991K$, TPV)

① 167,311. + 151,487. = 318,618.

30yr ③ ECR (@5.0/11.23%) = 7.213%

= 22,982 / 240 MW's = $95.76/kw

(95.76 * .564) / 4 = $13.50/kw/mn ② CWNT

(95.76 * .436) / 8 = 5.22/kw/mn SMR

FUEL, OPERATION & MAINTENANCE (1991K$, TPV)

		1st	2nd	
F O&M	①	61,008 +	49,930 =	110,938.
V O&M		7,638 +	6,703 =	14,341.
F Fuel		2890 x 2 x 9.808	=	56,690.
V Fuel		11410 x 2 x 18.263	=	416,762.
				598,731.

30yr ③ ECR (@7.0/11.23%) = 5.75%

= 34,427. / 1856 GWh = $18.55/MWh

18.55 * 1.2243 = $22.71 /MWh ② CWNT

18.55 * 0.8874 = 16.46 /MWh SMR

① Potential Resource WP's

② MPC Order 5484r

③ Existing Capital Recovery Factor

MPC

PULVERIZED COAL UNIT

REVENUE REQUIREMENT (1991 K$, TPV)

436,016.

36yr ECR (@ 5.0/11.23%) = 6.785%

29,585 / 150 MW = $197 / kw

(197. * .564) / 4 = $27.78 / kw/mn CONT

(197. * .436) / 8 = 10.74 / kw/mn CMR

OPERATION & MAINTENANCE (1991 K$, TPV)

F O&M	121,367.6	TOTAL:
V O&M	26,680.0	148,047.6

36yr ECR (@ 5.0/11.23%) = 6.785

= 10,033.4 / 1114.6 GWh = 9.00 $/MWh

FUEL (1991 K$)

19,428.7 * 11.239 TPVF = 169,353.

36yr ECR (@ 2.6/11.23%) = 8.897%

15,067.3 / 1114.6 = 13.52 $/MWh

TOTAL VARIABLE 22.52

Weighted Variable Escalation rate:

(148 * 5.0) + (169 * 2.6) / 317 = 3.7%

TPV M$ O&M; TPV M$ FUEL

Attachment F - EEAF Impact

MEMORANDUM

TO : File

FROM: John Leland

DATE: July 29, 1992

RE : EEAF Impact

This memorandum provides a discussion of the static and dynamic analysis concerning EEAF impact on resource choice.

Static Analysis

The objective of the static analysis was to analyze the bid resources and screen out resources based on a screening ratio which included an environmental externality adjustment factor (EEAF). The EEAF was developed using an environmental matrix. EEAFs were developed using the following criteria.

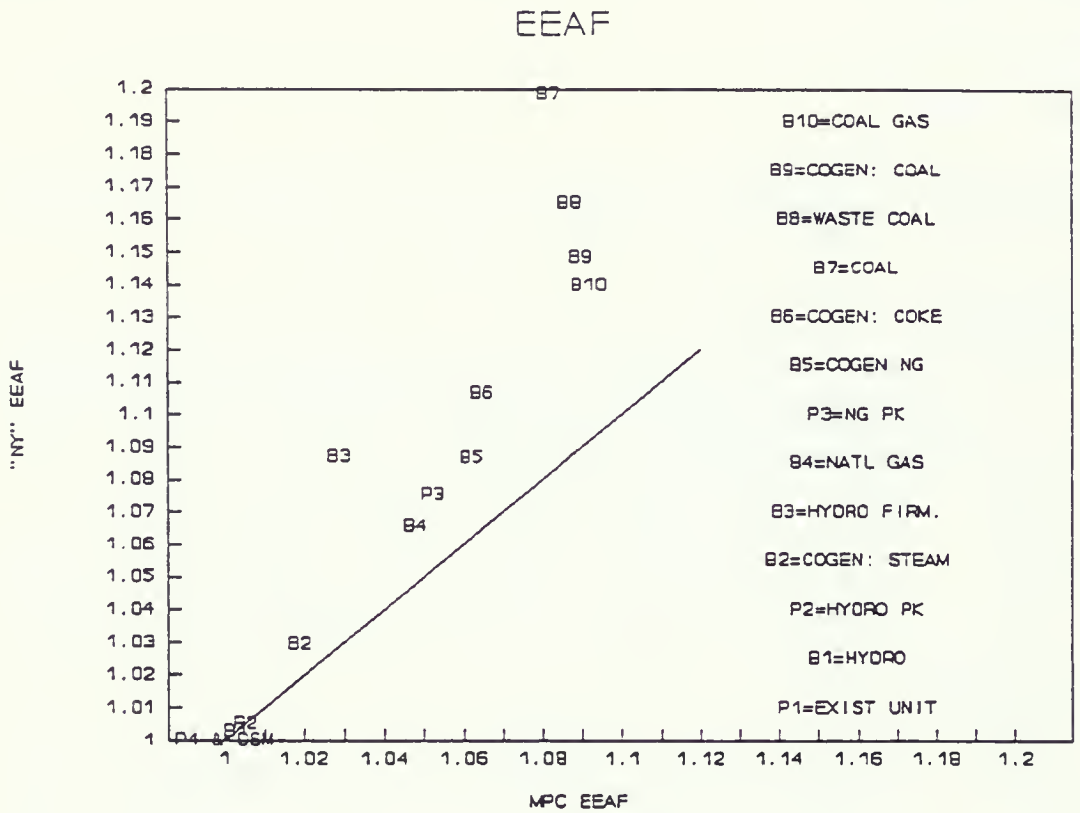
> No EEAF: EEAF for all resource was set equal to 1.000.

> MPC EEAF: MPC's environmental externality matrix was used to identify the environmental externality impact for each resource. The result of the matrix analysis was pro-rated to a 1.000 to 1.150 scale. The 1.150 was equated to a generic pulverized coal unit before the 1990 clean air act requirements. EEAF's of less than 1.000 or greater than 1.150 were possible.

> "NY" EEAF: All non-air environmental externality impacts were evaluated through MPC's environmental externality matrix. The impacts to air were set equal to the New York's adders. The "NY" EEAF was computed as the ratio of the adjusted bid price divided by the original bid price. The adjusted bid price is the original bid price times the non-air EEAF plus the New York air adders.

The MPC EEAF and the "NY" EEAF are displayed on attachment 1. A plus sign in the column labeled "+ Selected" identify the resources that passed the static screen. The EEAF percent difference from the MPC EEAF to the "NY" EEAF can be seen in the far right column. A summary of the data shown on attachment 1 is displayed in the graph below. The x and y axis in the graph represent the weighted MPC EEAF and weighted "NY" EEAF, respectively. For each type of generating facility (coal gas, waste coal, etc.) the MPC and "NY" EEAF value are plotted against the x and y axis, respectively, and marked by a label. The B or P in the label represent base load or peaking resource, respectively. Thus, the base load waste coal project with a MPC EEAF of 1.087 and "NY" EEAF of 1.165 is represented by the label B8 on the graph. If no change from MPC EEAF to the "NY" EEAF occurred, the resource label is plotted on

the line running from the lower left corner toward the upper right corner. Therefore, the further the resource label is from the "no change" line the greater the change between MPC's and "NY" EEAFs. Examination of the graph reveals that the resources which use



coal as their fuel (B7, B8, B9, B10) have the greatest EEAF increase while hydro, surplus and demand side resource (B1, P1, P2, DSM) have the least change.

Using the three different EEAF's, three screening ratios for each project were computed using the following formula.

$$\frac{Benefit * Loss\ Adjustment + Dispatch\ Benefit}{Bid\ Price * EEAF + Debt\ Equivalent\ Equity}$$

Attachment 2 displays the screening ratios for each project that were computed using the three EEAFs. MPC's EEAF was used to select the resources that passed the static analysis and is shown in the column labeled "With MPC EEAF". A close examination of this table indicates that the same resources would have been selected under any EEAF used. That is, a different level of EEAF wouldn't have changed MPC's selection criteria of identifying a wide variety of resource technologies, fuel, size and life.

Dynamic Analysis

The objective of the dynamic analysis was to use the resource that passed the static analysis and MPC's existing resources to build resource plans that meet our customers forecast need for electricity. Attachment 3 displays the results of the dynamic analysis. The columns with the heading "2030" represent the societal cost of the resource plan in total present value dollars and levelized dollars. The following pictorial summarizes the **resource changes** starting with the No EEAF plans to the MPC EEAF plans to the "NY" EEAF resource plans as a result of different EEAF values.

Resource Changes

No EEAF Plans	MPC EEAF Plans	"NY" EEAF Plans
Plan 2 --------->	Plan 2 ---------->	Plan 2
	-no change	-no change
Plan 4 --------->	Plan 4 ---------->	Plan 20
	-no change	-C eliminated
		-Bird peaking to firming
		-T.Falls 3yr earlier
		-Basin 1yr earlier
Plan 7 --------->	Plan 7 ---------->	Plan 11
	-no change	-C eliminated
		-Bird peaking to firming
		-Ryan 2 yrs earlier
		-Basin 1yr earlier
Plan 60 -------->	Plan 56 ---------->	Plan 23
	-no change	-C eliminated
		-B included
		-Bird firming included
		-T.Falls 3yr later
Plan 82 -------->	Plan 124 ---------->	Plan 105
	-B eliminated	-no change
	-C eliminated	
	-Basin included	
	-Westmoreland 1yr earlier	
Plan 64 -------->	Plan 92 ---------->	Plan 79
	-C eliminated	-no change
	-Ryan eliminated	
	-T.Falls included	
	-Basin included	

This table clearly shows that as the EEAF value increased resource C is replaced by alternative resources. In the Plan 64 sequence, Ryan is probably replaced in resource plan 92 because of energy need created when C is eliminated and not because of a different

EEAF.

Conclusion

The conclusion from this analysis are as follows.

> The same set of resources would have been selected in the static analysis and passed to the dynamic analysis.

> In the dynamic analysis, the selection of resource C (i.e. Stone Container proposal DSM2) is sensitive to increased EEAF value.

EEAF Difference

		BID #	MW	MPC EEAF	"NY" EEAF	+ Selected	% Difference From MPC To "NY"
BASE LOAD	COAL GAS	1	80	1.092	1.140	+	4.4%
	WASTE COAL	68A	92	1.083	1.176		8.5%
		68C	158	1.077	1.146		6.4%
		68B	125	1.083	1.155		6.6%
		45	40	1.095	1.185		8.3%
		44	40	1.125	1.213		7.8%
		43	40	1.104	1.178		6.7%
	Wei Avg			1.087	1.165		7.2%
	COAL+NG	65B	194	1.075	1.175		9.3%
		65C	227	1.075	1.168		8.7%
	Wei Avg			1.075	1.171		8.9%
	COAL	65A	161	1.082	1.198	+	10.8%
	COGEN: NG	C	38	1.023	1.181	+	15.4%
		21	115	1.042	1.062		2.0%
		55	121	1.130	1.146		1.4%
		12B	42	1.054	1.081		2.6%
		54	113	1.097	1.111		1.2%
		40	140	1.047	1.064		1.6%
		28	129	1.027	1.057	+	2.9%
		56	114	1.069	1.083		1.3%
		4	111	1.044	1.060		1.5%
	Wei Avg			1.062	1.087		2.3%
	COGEN: STEAM	B	15	1.019	1.029	+	1.0%
	COGEN: COKE	35A	68	1.065	1.106	+	3.9%
	COGEN: COAL	13	125	1.090	1.148		5.4%
	NATURAL GAS	66A	92	1.044	1.063	+	1.8%
		66C	158	1.044	1.066		2.1%
		66B	125	1.044	1.064		1.9%
		69	94	1.046	1.065		1.8%
		30B	156	1.058	1.074		1.5%
		31B	156	1.043	1.059		1.5%
		30A	156	1.058	1.074		1.5%
		31A	156	1.043	1.059		1.5%
	Wei Avg			1.048	1.066		1.7%
	HYDRO FIRM.	BDb	60	1.029	1.087	+	5.7%
	HYDRO	14	5	0.999	0.999	+	0.0%
		TFa	14	1.004	1.004	+	0.0%
	Wei Avg			1.003	1.003		0.0%
	SURPLUS	33A	114	1.000	1.000		0.0%
PEAKING	WINTER DELIV	6A	98	1.000	1.000	+	0.0%
		33B	114	1.000	1.000		0.0%
	Wei Avg			1.000	1.000		0.0%
	EXCHANGE	IXA	50	1.000	1.000	+	0.0%
		IXB	76	1.000	1.000	+	0.0%
		AEX	50	1.000	1.000		0.0%
	Wei Avg			1.000	1.000		0.0%
	NG	BDa	60	1.047	1.084	+	3.5%
		WEST	33	1.026	1.049	+	2.2%
		CT	42	1.081	1.084		0.3%
	Wei Avg			1.052	1.075		2.2%
	HYDRO	RYN	43	1.021	1.021	+	0.0%
		TFd	41	1.004	1.004	+	0.0%
		38	100	0.999	0.999	+	0.0%
	Wei Avg			1.005	1.005		0.0%
DSM	DEMAND-SIDE	2SA	116	1.000	1.000	+	0.0%
		4S	89	1.000	1.000	+	0.0%
		4A	140	1.000	1.000	+	0.0%
		A	2	1.000	1.000		0.0%
	Wei Avg			1.000	1.000		0.0%

Attach 1

Static Screening Ratio

				Screening Ratio				Percent Difference	
		BID #	MW	No EEAF	With MPC EEAF	With "NY" EEAF	+ Selected	From No To MPC	From MPC To "NY"
BASE LOAD	COAL GAS	1	80	1.61	1.48	1.42	+	-7.8%	-3.9%
	WASTE COAL	68A	92	1.04	0.98	0.92		-5.9%	-6.2%
		68C	158	1.08	1.02	0.97		-5.7%	-4.8%
		68B	125	1.05	0.99	0.94		-6.0%	-4.9%
		45	40	1.10	1.02	0.96		-7.2%	-6.4%
		44	40	1.07	0.97	0.91		-9.0%	-6.0%
		43	40	0.91	0.84	0.80		-7.5%	-5.1%
	Wei Avg			1.05	0.99	0.93		-6.3%	-5.4%
	COAL+NG	65B	194	1.18	1.11	1.04		-5.4%	-6.7%
		65C	227	1.19	1.12	1.05		-5.5%	-6.4%
	Wei Avg			1.18	1.12	1.05		-5.4%	-6.5%
	COAL	65A	161	1.15	1.09	1.00	+	-5.9%	-7.7%
	COGEN: NG	C	38	1.41	1.38	1.21	+	-2.1%	-12.4%
		21	115	1.05	1.02	1.00		-3.4%	-1.6%
		55	121	1.01	0.91	0.90		-9.9%	-1.2%
		12B	42	0.95	0.91	0.89		-4.4%	-2.1%
		54	113	0.98	0.90	0.89		-7.6%	-1.1%
		40	140	1.00	0.96	0.95		-4.1%	-1.5%
		28	129	1.11	1.08	1.05	+	-2.5%	-2.6%
		56	114	1.04	0.98	0.97		-6.1%	-1.2%
		4	111	0.97	0.93	0.92		-3.8%	-1.4%
	Wei Avg			1.04	0.98	0.96		-5.0%	-2.2%
	COGEN: STEAM	B	15	1.39	1.37	1.36	+	-1.7%	-0.9%
	COGEN: COKE	35A	68	1.26	1.19	1.15	+	-5.6%	-3.4%
	COGEN: COAL	13	125	1.11	1.04	1.00		-6.5%	-4.1%
	NATURAL GAS	66A	92	1.20	1.15	1.14	+	-3.6%	-1.5%
		66C	158	1.15	1.11	1.09		-3.6%	-1.8%
		66B	125	1.09	1.05	1.04		-3.5%	-1.5%
		69	94	1.04	1.00	0.99		-3.8%	-1.5%
		30B	156	1.00	0.95	0.94		-4.7%	-1.3%
		31B	156	1.00	0.96	0.95		-3.5%	-1.3%
		30A	156	0.92	0.88	0.87		-4.3%	-1.2%
		31A	156	0.92	0.89	0.88		-3.2%	-1.2%
	Wei Avg			1.03	0.99	0.98		-3.8%	-1.4%
	HYDRO FIRM.	BDb	60	1.37	1.33	1.26	+	-2.8%	-5.4%
	HYDRO	14	5	1.09	1.09	1.09	+	0.1%	0.0%
		TFa	14	1.43	1.42	1.42	+	-0.4%	0.0%
	Wei Avg			1.34	1.33	1.33		-0.3%	0.0%
	SURPLUS	33A	114	1.00	1.00	1.00		0.0%	0.0%
PEAKING	WINTER DELIV	6A	98	1.35	1.35	1.35	+	0.0%	0.0%
		33B	114	1.03	1.03	1.03		0.0%	0.0%
	Wei Avg			1.18	1.18	1.18		0.0%	0.0%
	EXCHANGE	IXA	50	1.54	1.54	1.54	+	0.0%	0.0%
		IXB	76	1.54	1.54	1.54	+	0.0%	0.0%
		AEX	50	1.34	1.34	1.34		0.0%	0.0%
	Wei Avg			1.49	1.49	1.49		0.0%	0.0%
	NG	BDa	60	1.07	1.02	0.98	+	-4.5%	-3.4%
		WEST	33	0.80	0.78	0.77	+	-2.1%	-1.8%
		CT	42	0.93	0.86	0.85		-7.5%	-0.3%
	Wei Avg			0.96	0.91	0.89		-4.9%	-2.1%
	HYDRO	RYN	43	1.41	1.38	1.38	+	-2.1%	0.0%
		TFd	41	1.43	1.43	1.43	+	-0.4%	0.0%
		38	100	0.79	0.79	0.79	+	0.1%	0.0%
	Wei Avg			1.08	1.07	1.07		-0.7%	0.0%
DSM	DEMAND-SIDE	2SA	116	2.46	2.46	2.46	+	0.0%	0.0%
		4S	89	2.83	2.83	2.83	+	0.0%	0.0%
		4A	140	2.37	2.37	2.37	+	0.0%	0.0%
		A	2	1.00	1.00	1.00		0.0%	0.0%
	Wei Avg			2.51	2.51	2.51		0.0%	0.0%

Attch 2

EEAF R&U ANALYSIS

Similar Resource Plans
07/21/92
01:47 PM

RESOURCE PLANS WITH SASA DSM

	2030		Dif From W/EEAF		2000 S or D		Resource Timings With SASA DSM (e.g. 98 = 1998, 0 = 2000)											
Plan #	TTL M$	LvlM$*	Lvl M$	%	MWa	MW	Ry	Bird Firm	TF	Id Exc	Ston #B	Bsn #06	Bird Peak	Tibr #14	West #66	LS #35	Ston #C	PPwr #38	CT	EEAF TYPE
2	2,443.2	278.3			76	−5				98	96	97	97	00			96			W/EEAF
2	2,441.2	278.1	−0.2	−0.1%	76	−5				98	96	97	97	00			96			NO EEAF
2	2,451.7	279.3	1.0	0.3%	76	−5				98	96	96	97	00			97			NY EEAF
4	2,455.3	279.7			87	40			00	98	96	97	97				96			W/EEAF
4	2,453.1	279.4	−0.2	−0.1%	87	40			00	98	96	97	97				96			NO EEAF
20	2,461.6	280.4	0.7	0.3%	98	2		97	97	98	96	96								NY EEAF
7	2,458.7	280.1			72	33	99			98	96	97	97				96			W/EEAF
7	2,456.2	279.8	−0.3	−0.1%	72	33	99			98	96	97	97				96			NO EEAF
11	2,463.5	280.6	0.5	0.2%	83	−5	97	97		98	96	96								NY EEAF
56	2,472.7	281.7			71	8	97		97	98		96					96			W/EEAF
60	2,470.5	281.4	−0.2	−0.1%	89	61	97		97	98		96					96			NO EEAF
23	2,479.0	282.4	0.7	0.3%	99	45	97	97	00	98	96	96								NY EEAF
124	2,479.1	282.4			109	29				98		97	97		96					W/EEAF
82	2,456.1	279.8	−2.6	−0.9%	104	0				98	96		97		97		96			NO EEAF
105	2,483.3	282.9	0.5	0.2%	109	29				98		97	97		96					NY EEAF
92	2,477.0	282.2			108	10			97	98	96	96				97				W/EEAF
64	2,468.8	281.2	−0.9	−0.3%	94	66	97			98	96					97	96			NO EEAF
79	2,485.1	283.1	0.9	0.3%	108	10			97	98	96	96				97				NY EEAF

* Lvl M$ is levelized million dollars.
UCR(11.23%,40yr)= 0.114

A#1, 3

Attachment G - Litchfield Consulting Group, Inc.

LITCHFIELD CONSULTING GROUP LCG

One Main Place, Suite 900
101 S.W. Main Street
Portland, OR 97204
503-222-9480 Office
503-799-3400 Cellular
503-222-9668 Fax

July 6, 1992

Tom Worring
Montana Power Company
40 East Broadway
Butte, MT 59701

Dear Tom:

Attached is my evaluation of Montana Power Company's (MPC's) resource bid evaluation process. MPC's evaluation of bid resources relies on the methodologies and models that MPC uses in your Integrated Least Cost Resource Planning process. The company's plan provides a good benchmark for evaluating future resource alternatives. MPC's least cost plan provides the analytic foundation for this bid evaluation process.

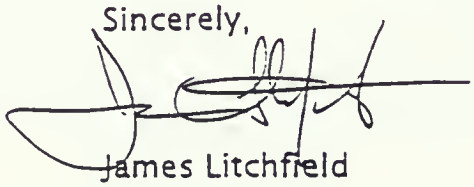
MPC's quantitative analysis is the backbone of the bid evaluation process. This analysis is based on technical, economic and environmental information submitted by developers or developed in MPC's planning process. However, the staff is cognizant and sensitive to the fact that quantitative analysis cannot, and should not, be the only factor in the final decision. It is for this reason that all resources are being evaluated on both quantitative and subjective attributes. Decision makers must make tradeoffs between competing attributes using their judgment.

This review found a highly competent and conscientious technical staff engaged in a very thorough, objective and fair resource evaluation process. In most cases the staff have been reluctant to reject resources because any particular resource might have something unique to offer MPC. Most resources were analyzed in greater detail to determine if there were any conditions under which a resource could compete. MPC's staff have used their technical judgment in very limited ways. Staff often chose to include resources that failed to meet pre-established screening criteria. Staff overruled quantitative screening criteria when they appeared to miss important resource characteristics.

The bid evaluation process was not complete during this review. The staff planned to conduct additional analysis of risks, uncertainties and non-quantitative factors to provide decision makers a comprehensive picture of each resource. Resources vary in their ability to manage uncertainties and risks by being able to adapt to changing power conditions. Sensitivity studies are planned to help identify how some resources might allow MPC to better manage risk and uncertainty.

When complete, MPC's bid evaluation process will provide a comprehensive evaluation of new resources. Ultimately resource decisions must be based on judgment. In support of decision maker judgment, the process provides decision makers with an analysis of both quantitative and qualitative attributes. The technical evaluation staff have been careful to not create a process where a "black box" makes decisions without judgment. This resource evaluation process provides MPC management with the information needed in order to make informed judgments about those resources that can best meet MPC's future energy needs.

Sincerely,



James Litchfield
President
Litchfield Consulting Group, Inc.

Purpose, Objectives and Scope

This report reviews Montana Power Company's (MPC) first resource bid evaluation process. The consultant has considerable experience in working with the Montana Public Service Commission (MPSC), the Conservation and Least Cost Planning Advisory Committee (CLCPAC), and the planning staff at MPC through the process of developing the company's Integrated Least Cost Resource Plans(ILCRP). This experience provides a basis for evaluating the current bid evaluation process. The ILCRP provides a context for determining the degree of consistency between the current bid evaluation process and MPC's planning decisions.

The scope of this review includes the process used to evaluate resource proposals, the models used to estimate costs and benefits and the decision making process for making recommendations. This evaluation is being conducted by an external party to provide an independent perspective on the bid evaluation process. This report may also be used to provide recommendations for the design of future resource bid evaluation processes.

The schedule for evaluating the bids required this review to be completed in a short time period. At this time the results of the dynamic analysis are complete, but the risk and uncertainty analysis along with the detailed resource reviews are not complete. For this reason the review was restricted to an overall evaluation of the process rather than an in-depth audit of the technical details, bid prices, and cost estimates used in the evaluation.

Findings and Conclusions

The MPC staff followed an extremely thorough process for evaluating the costs and benefits of bid resources. The staff relied on guidance from three groups external to the evaluation process. The first group involved MPC's Conservation and Least Cost Planning Advisory Committee. The CLCPAC involves broad representation from the major interest groups involved in MPC's planning. This group has been instrumental in encouraging the company to engage in bidding in order to identify least cost future resources.

The second group that provided guidance to the evaluation team was MPC middle management. Middle manager's provided an internal review and check on the overall evaluation process, the technical approaches used for screening various resource alternatives and the definition of important resource attributes in the evaluation.

In addition to the guidance from the CLCPAC and middle management, the evaluation team made several presentations to upper management at MPC. Upper management are the company's decision makers and as such are responsible for selection of new electric power resources. Upper management identified important attributes of future resources. The analysis staff used this guidance to design the evaluation process to produce the kinds of information that each group needed.

The evaluation of bid resources involved two fundamental analytic processes. The first is called a static analysis. Static analysis is designed to evaluate each bid resource in a stand-alone fashion. The objectives of the static analysis are to rank order the various resources based on their ability to contribute to the electric power needs of MPC.

A second, and more detailed, review was conducted in the dynamic analysis. In dynamic analysis various resource alternatives are configured in groups called resource plans. Each plan is evaluated using a computer model of MPC power system. The model analyzes the ability of a plan to meet MPC's capacity and energy needs at the lowest possible cost. This evaluation determines the best mix of bid resources that provide MPC customers with the lowest total cost of power. An important part of dynamic analysis is the evaluation of the dispatch of bid resources with the existing power system.

The Static Analysis is based on benefit cost screening ratios. These screening ratios determine the benefits of a future resource addition using the company's latest avoided cost estimates as a surrogate for benefits. The latest avoided costs have not been approved by the MPSC, yet they are probably the best estimates of MPC's future costs. In theory, these costs could be avoided by acquiring bid resources. The screening ratio uses the proposers prices as an estimate of resource costs. The ratio of the benefits to the costs determines the screening ratio that is used to rank both bid and company owned resources. In addition to the screening ratio, the evaluation team analyzed the impacts of dispatching resources to determine the benefits likely to accrue for those resources that could be dispatched when MPC's system is surplus.

MPC also analyzed the impact of purchase power on the company's financial position. This analysis was conducted to evaluate the possible increase in the company's equity requirements that could result if the rating agencies continue to look at purchase power contracts as debt obligations.

Also analyzed was the impact of environmental externalities on the benefit-cost screening ratios. A factor that ranged from less than 1 to over 1.15 was

multiplied times the resource cost as an estimate of the costs of external environmental impacts. These estimates were developed in conjunction with the CLCPAC and work that is ongoing on MPC's integrated least cost plan.

The static analysis also analyzed the impact of future resource development on transmission and distribution (T&D) systems. Because all resources have different T&D impacts, the analysis corrected for the ability of some resources, such as conservation, to reduce T&D loses and costs. This analysis had a positive impact on conservation measures because they avoid both T&D losses and costs.

All resources, both bid and company owned, were analyzed using the same methodology. The analysis and the evaluation was designed to provide a level competition between all resources and their ability to meet the needs of MPC's customers. The evaluation staff made an effort to retain bid resources even though the early screens indicated that they should be rejected. This approach was used to include resources who's value might be missed in the screening analysis. Several of the bids were actually moved on to additional levels of analysis even though they failed to meet specific screening criteria. Unusual resources such as pumped hydro projects, were also retained for further analysis because the evaluation staff recognized that static analysis was not able to evaluate it's benefits.

MPC's staff were conscientious in the use of their technical judgment. Judgment was used primarily to broaden the analysis and to be more inclusive of resources that failed specific quantitative criteria. This allows for additional analysis to be done on resource alternatives that perhaps offer some unique aspects or attributes that have not been captured during less sophisticated analytic stages.

Following the static analysis a two stage dynamic analysis was conducted. The dynamic analysis used MPC's power system models and methodologies. MPC's power system and planning models were used in the development of the Integrated Least Cost Resource Plan. These models evaluate timing, size and dispatch issues for a mix of resources. Specific interactions between and among the existing resources and new resources are evaluated to determine the impact on total present value power system costs. Dynamic analysis was used to illustrate the various combinations of both bid and MPC resources that can best meet MPC's future power needs. The analysis focused on the time period between 1995 and 2000, however the studies were extended to 2030 to capture possible end effects of differing resource lives.

The evaluation process also recognized that dynamic analysis was only a part

of the resource decision making process. MPC's evaluation team met with MPC management and the CLCPAC to define the most important attributes of future resources. The dynamic analysis will be followed by an evaluation of the highest priority resources on a variety of both subjective and quantitative attributes. Decision makers will then use judgment to make balanced tradeoffs between the various resource attributes. The application of non-quantitative attributes through judgment is a sound decision making approach and recognizes that it is impossible for quantitative analysis to incorporate all attributes of importance to MPC.

Issues like the expiration of the BPA Capacity Energy Exchange contract in 2001 should be incorporated judgmentally into the decision making process. The dynamic analysis may not have adequately accounted for this potentially large change in the MPC's power future. The expiration in 2001 is just after the period for acquiring bid resources. If the BPA contract cannot be successfully negotiated, at terms and conditions similar to those in effect today, MPC's need for resources and avoided costs may be understated.

While bidders were notified that MPC's resources were to be included in the bid evaluation, this point was intentionally not stressed. By not providing a quantitative target with MPC resource costs and characteristics it was hoped that there would be more competition between bidders. As a result, some bidders were surprised when MPC resources were included.

The bid package and the information given to bidders could have been more specific about the inclusion of MPC's resources and their predicted cost and performance characteristics. This would have given many of the resource proposers clearer economic targets and helped to avoid surprise by some of the bidders that their resources were not competitive with MPC's resources. However, this may have limited the competitive nature of the solicitation and some of the bidders may have only bid one mill less than MPC's resources.

The bid evaluation process is a very important step for MPC resources. If MPC's resources can successfully compete with those proposed by independent power developers, then MPC will have a better case for cost-effectiveness of the company's resources before the MPSC. This will give an important validation to MPC's resources. Those MPC resources that are not successful in competing with independently developed projects should probably be dropped unless there are extenuating circumstances that indicate they have value that was missed in the evaluation.

While the current evaluation is incomplete, a look at the preliminary results indicated a potential political and public image problem. MPC's resources are

currently dominating the resources that appear to be most cost effective in the dynamic analysis. In addition, some MPC resources are potential lost opportunities due to FERC licensing issues. Resources such as Thompson Falls and Ryan may be resource alternatives that MPC must act on or the opportunity to acquire these resources could be lost. While the resources may not go away, it is possible that the ability for MPC to secure these resources could be lost forever. Other MPC resources appear to be low cost and are therefore playing a role in most future resource plans.

Of the seventy-seven bid resources it currently appears that only eight or nine independent proposers are competitive with MPC resources. For a large number of the bidders, this evaluation may seem to be a process to justify MPC resources. Because resource proposals can be expensive, some bidders could be very unhappy when MPC's resources are selected.

This potential perception problem could be dealt with by MPC selecting the best of the bid resources as resource options instead of rejecting many of them at this time. Resource options are secured by financing the early stages of project development . MPC would need to finance siting, licensing, and design activities for resources you select to option. The idea behind options is to be able to hold the development of the resource at a time just before beginning construction. This will give MPC the flexibility to respond rapidly if loads grow faster than expected or some of existing or future resources fail to operate as planned.

The early phases of resource development are usually the lowest cost phases, however, the costs will be significant. MPC will need to seek the MPSC's approval of expensing the costs of securing options before this strategy could be implemented. By securing options on the lowest cost bid resources MPSC could better deal with regional uncertainties such as future load growth, salmon impacts on the Northwest hydro system and the potential loss of the Trojan Nuclear Power Plant. Those options that are likely to be cost effective for sale on the wholesale power market could be attractive options for MPC to acquire and sell until MPC's customers need them.

Review of the Bid Evaluation Process

MPC's bid evaluation process began more than five years ago with the development of the integrated least cost resource plan and the establishment of a public advisory committee to help provide an outside perspective. The CLCPAC recommended bidding in their "red book" as a way to identify unique low cost resources. In particular, the CLCPAC recommended bidding for three apparent reasons.

1. To help identify unique low cost resources

2. To secure the benefits of competition among demand side energy service companies and independent power producers

3. To provide validation and verification of the cost effectiveness of MPC owned resources.

In response to these recommendations, MPC published the first bid package on July 29, 1991. This request for resource proposals identifies future resource needs from the integrated least cost plan during the time period from 1995-2000. Following release of the bid package MPC had a pre-bidders conference on October 4, 1991. By December 20, 1991, the deadline for submitting proposals, MPC had received 77 proposals. A five step bid evaluation process was then initiated.

Step 1. Preliminary Screening and Completeness Check for all Seventy-Seven Proposals

Six MPC staff read and reviewed each of the seventy-seven proposals for completeness. Where proposals were either deficient or there were questions, the proposers were asked for additional information. In some cases several iterations of questions and responses occurred before the MPC staff were able to verify that sufficient information was available for the evaluation to proceed. Some resource developers requested informational meetings to exchange information. These requests were granted and additional information was received during these meetings from the developers.

The bid evaluation package did not recommend specific assumptions for various escalation rates. For this reason, many of the bidders assumptions of future price escalation rates were inconsistent. Where proposers were willing to accept the risk of future price escalation, the actual prices as proposed by the developer were used. For all other bids, the MPC staff decided to evaluate

the bids with two separate sets of escalation assumptions. The first was to use the proposers estimates of future price escalation. Then as a consistency check, the proposed price escalators were modified to match DRI's summer 1991 estimates.

Three resource proposals were found to be inadequate and were therefore not evaluated further. Six MPC review staff then filled out detailed data sheets for each of the seventy-four qualified bids.

Step 2. Static Screening of Bids

Static screening was designed to rank order resources based on benefit/cost ratios. Those resources that provided large benefits at low cost would obviously be the most important resources for MPC to acquire. The static screening was conducted with two separate cuts. The first cut was designed to estimate the benefit cost screening ratio for each resource using a simplified benefits analysis.

The benefits for each resource were estimated based on MPC's latest avoided cost estimates. These estimates of avoided costs provide values for capacity and energy during every year over the lifetime of the resource. While the latest avoided costs have not been formally approved by the MPSC, they are the best estimate of the value of capacity and energy to MPC. An estimate of the benefits of each resource was developed using these avoided costs.

The prices that were included in the bid were used as the best estimate of resource cost. A ratio indicating the variance from MPC's avoided costs was developed by dividing the present value benefits by the present value costs. As discussed earlier, cost estimates were evaluated in two ways. The first was as proposed by the resource developer and a second way using DRI's price escalators. From this first cut screening, 43 resources were moved on for more detailed static screening.

The second cut of the static screening was designed to evaluate the 43 remaining resources on other attributes that could impact on overall acceptability, reliability and cost. Quantitative estimates of each resource's performance on the following attributes were developed.

1. Environmental externalities

2. Transmission and distribution loss adjustments

3. Job and tax benefits

4. Dispatch ability and dispatch benefits

5. Dynamic benefits of resource operations

6. Impacts of purchase power on utility financing ratios

The objective of this second cut of the static analysis was to reduce the number of resources for dynamic consideration to not more than 12. The staff recognized that an arbitrary cutoff of 12 might not be the best point to discriminate among resources. Other non-quantitative attributes such as maximizing operating diversity, technology mix, sponsor and fuel diversity were also used to include resources that might have some possibility of integrating well with MPC's needs. The staff were also looking at resources to make sure that they had a variety of sizes with appropriate starting dates and resource lifetimes to match with MPC's resource needs. Analytic judgment was used to evaluate the risk to MPC of future resource development. Various non-price factors were incorporated in the screening process to include resources that might achieve other attributes not measured by the screening methodology.

The result of this second cut of the static screening was to select 21 resources for dynamic analysis. The evaluation staff felt that there were 21 potentially viable and attractive resources so the objective of reducing the number of resources for dynamic analysis to 12 was overruled. The analysis staff wanted to be comprehensive and inclusive of any resource that potentially could provide benefits.

The prices for capacity ($/kW) and the total levelized resource price for energy (mills/kWh) were compared in this review to gain a feel for the results obtained from the static screening. Figure 1 shows a plot of the bid resources. Each resource was plotted as a point based on its price for capacity and total energy. The points that are numbered are those resource bids chosen for dynamic analysis. Because of the timing of this review, data on MPC resources was not available. Therefore, MPC resources are not shown on this figure. The resources selected for further analysis were those with the lowest cost of energy with the exception of bid numbers 17, 21 and 31.

For these resources it may have been the low cost of capacity that provided benefits in the screening ratios. As a cross check of the screening ratios, Figure 1 shows that the resources selected by the screening ratio method generally make sense when looking only at bid price.

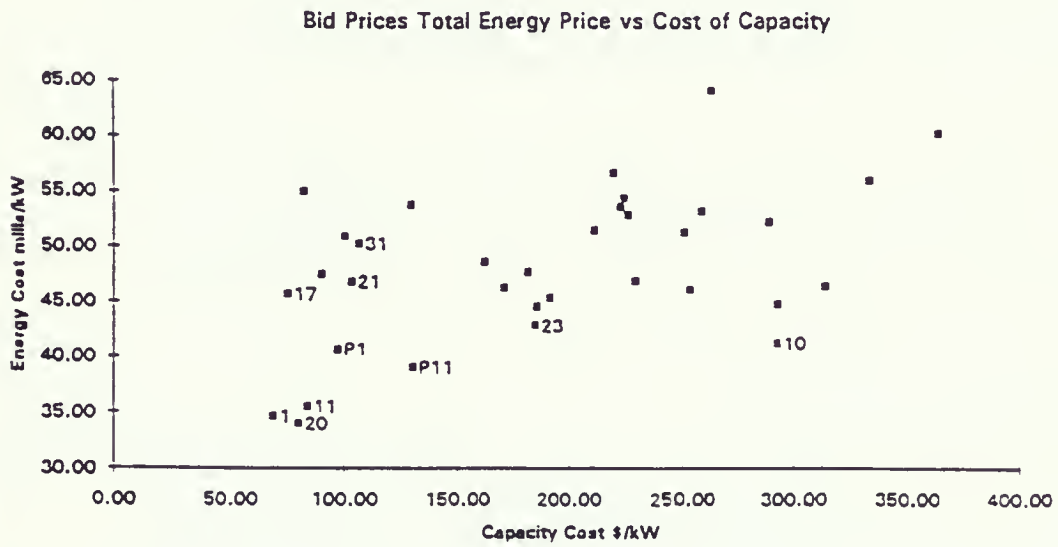


Figure 1. Scatter Diagram of Bid Prices for Capacity and Total Energy

Step 3. Dynamic Analysis

The dynamic analysis used PROVIEW and PROSCREEN to evaluate and develop least cost mixes of bid and MPC owned resources. These future resource mixes were called "plans" to identify them as future strategies for combining resources to meet MPC's needs. There were too many resources passing the static screening to be able to be modeled in one PROVIEW run. For this reason, resources were grouped into two runs based on their technical and economic characteristics.

Like the static analysis, the dynamic analysis was conducted in two separate stages. The first stage was designed to reduce the number of resources by eliminating those resources that were unlikely to contribute to MPC's future needs. Many combinations of resources were evaluated as plans. Based on this evaluation it was obvious that two of the higher cost resources were not likely to be cost effective. For this reason these two higher cost resources

were eliminated from further analysis. The first stage of the dynamic analysis passed all remaining resources on to additional dynamic analysis.

The second stage of the dynamic analysis reconfigured all remaining resources into plans. Based on an economic evaluation of the total cost of each plan, six plans were selected for additional analysis. These plans have the greatest potential for meeting MPC's future energy needs at the least total cost. The plans were chosen based on present value total cost, resource timing and the desire to test alternative resources that showed the greatest value to MPC.

At the time this review was conducted the bid evaluation process was still underway. For this reason the following steps in the evaluation were not complete. When these analysis and evaluation steps are completed, they will provide a comprehensive evaluation of all of the important quantitative and qualitative aspects of the remaining resources.

Step 4. Risk and Uncertainty Analysis

Following the second stage of the dynamic analysis, MPC will analyze the six plans to determine the various aspects of risk and uncertainty that could impact on future resource development. This evaluation is designed to incorporate major sources of uncertainty that were identified by the CLCPAC and MPC management. These uncertainties included:

1. Rate of conservation acquisition
2. Water Conditions
3. Fuel price and fuel price escalation rates
4. Load growth
5. Environmental externalities
6. Financial debt/equity ratios
7. Technical feasibility and reliability.

Uncertainty analysis and risk assessment will be conducted using PROSCREEN. This analysis will provide estimates of the sensitivity of groups of resources to major sources of uncertainty.

Step 5. Detailed Analysis of Each Resource

Those resources in the six alternative future plans that are of greatest value and lowest risk will be evaluated in greater detail. This detailed resource analysis begins with transmission system modeling to determine the likely impacts on the transmission system, of specific resources at specific sites.

The environmental review that was conducted to develop estimates of the externality factors was at a screening level. Environmental specialists will reevaluate the environmental consequences of those resources that are likely to be selected by MPC. Each resource and its site will be scrutinized for possible environmental issues. This review may require site visits to determine the likely siting and licensing issues that could effect the reliability and cost of these resources.

A third team is focused on detailed technical reviews of the resource technology and reliability issues. Power systems experts will evaluate the technology and equipment proposed by resource developers to determine whether the equipment will work as predicted. These engineers will also determine whether the proposed resource will interface as designed with MPC system without impacting on overall system reliability.

Another team is evaluating the financial impacts of developing various resources. Impacts on the company of altering debt/equity ratios or in acquiring the necessary resources for construction must be considered before selecting a particular resource strategy. In addition, this group will also be evaluating the regulatory issues surrounding resource development to evaluate remaining regulatory risks.

CONCLUSIONS

This brief review of MPC's resource evaluation process has found a highly competent and conscientious technical staff engaged in a very thorough, objective and fair evaluation process. In most cases the staff have been reluctant to reject resources. For this reason, resources have been carried through several stages of analysis than was justified based solely on the technical and economic characteristics of the resource. The evaluation staff were reluctant to reject resources because they believed that any particular resource might have something unique to offer MPC. Resources were therefore evaluated further than necessary to determine if the resource had any chance of competing with the other resource alternatives.

The technical evaluation team used evaluation methodologies and models that are consistent with MPC's Integrated Least Cost Resource Plan. The company's plan provides a good starting place for evaluating future resource alternatives. By using MPC's planning models and methodologies, the technical evaluation mirrors the analytic basis of the plan.

The quantitative analysis being conducted by MPC staff is based on technical, economic and environmental information developed in MPC's plan or submitted by the developers. This information has guided the evaluation and has been used to determine those resources that have the most to contribute to MPC's energy future. The staff is cognizant and sensitive to the fact that quantitative analysis cannot, and should not, make the ultimate decision.

Non-quantitative factors are being evaluated to help in making the final selection. Many factors involve how the resources will interact with one another and the existing system. Resources also vary in their ability to manage uncertainties and risks by being able to adapt to changing power conditions. Sensitivity studies are used to identify how resources might help MPC to manage risk and uncertainty. However, sensitivity studies usually analyze one risk at a time. Uncertainty and risk could be analyzed more comprehensively by using alternative modeling techniques designed to analyze simultaneous sources of uncertainty and their cumulative impacts on future resource costs and performance. In the future MPC may want to consider expanding the type of power system models used in order to better evaluate multiple sources of risk and uncertainty.

The bid evaluation process will provide accurate information for decision makers to select new resources. In the final analysis decisions must be based on judgment. This bid evaluation process is designed to provide both quantitative and qualitative information on which to base that judgment. The technical evaluation staff have been careful to not create a process where a "black box" makes decisions without appropriate tradeoffs. This resource evaluation process provides MPC management and the MPSC with the information needed in order to make an informed judgment about those resources that can best meet MPC's future energy needs.